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DIETETICS FOR NURSES



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DIETETICS FOR NURSES

BY

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FORMER INSTRUCTOR IN DIETETICS IN
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Dedicated

to the

Great Army of Nurses

in the Service

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THE AUTHOR WISHES TO ACKNOWLEDGE HER APPRECIATION FOR THE COURTESY EXTENDED TO HER BY MANY MEMBERS OF THE MEDICAL PROFESSION, MOST ESPECIALLY TO DRS. WARREN COLEMAN, LOUIS LEROY, OTIS WARR, AND PEARL STEVENS FOR VALUABLE SUGGESTIONS AND TO DR. F. S. SAFFORD FOR ASSISTANCE IN THE PREPARATION OF THE MANUSCRIPT

PREFACE

No other science has so much to do with the general welfare of mankind as the study of food and its effects in the human body. When we use the term "dietetics" as representing "the effect of the food in the human body," we do so in a very broad sense, for the subject is a big one, requiring comprehensive terms to express it.

The problems of nutrition are many. Food alone is no small subject and a still greater one is the utilization of food materials in such a way that the body may gain the greatest value with the least expenditure of vital forces. These problems are discussed in this text and the methods of overcoming them are given in the simplest possible language. For this purpose the subject of nutrition has been divided into groups: (1) a comprehensive study of the sources of food, its composition and nutritive value; (2) the effect of food in the body under normal conditions, as in health; and (3) its behavior and effect when conditions in the body become abnormal, as in disease. In this way much of the non-essential material is eliminated from the course of study and only that included which it is necessary for the nurse to understand and which she will constantly use both in the hospital and later on in the practice of her profession. The simple methods of study presented in this text are given with the idea of avoiding confusion in the mind of the average pupil nurse by fitting in the course with her other studies rather than by making it stand out as a separate subject. In this way she will be able to see at a glance the connection between the body processes and the materials which are used to carry them on. Thus her study of physiology, anatomy and bacteriology go hand in hand with that of dietetics, each bearing a distinct relationship to the others.

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SECTION I

FOOD AND ITS SIGNIFICANCE

LECTURE AND LABORATORY DIETETICS FOR THE PROBATIONER

CHAPTER I

FOOD

Food Materials. — Food is the name given to any substance which, taken into the body, is capable of performing one or more of the following functions:

1. Building and repairing tissue, maintenance, growth, and development of the muscles, bones, nerves, and the blood.
2. Furnishing the energy for the internal and external work of the body.
3. Regulating the body processes, maintaining the proper alkalinity and acidity of the various fluids throughout the body, regulating the proper degree of temperature, and determining the osmotic pressure, etc.

For the convenience of study scientists have arranged the foodstuffs in groups:

1. According to type;
2. According to their chemical composition;
3. According to the function they perform in the body.

All foods are composed of certain chemical elements; namely, carbon, oxygen, hydrogen, nitrogen, sulphur, phosphorus, iron, magnesium, potassium, chlorine, sodium, calcium, with traces of various others. The manner in which these elements are combined and the amounts in which they occur determine the group to which the combination belongs, and give to the foodstuff its characteristic position in human nutrition.

One combination cannot be said to be of greater importance than another, since the needs of nature are best met by a judicious combination of all, but the wear and tear of life can be more efficiently accounted for, and the strain of the organism reduced to a minimum, if the chemical combinations are furnished in the amounts which science has proved to be necessary to keep the body in good order.

The following table gives a definite idea as to the classification of the foodstuffs according to their chemical composition and their functional activity in the body:

TABLE I

CLASSIFICATION OF FOOD MATERIALS

			Fuel Foods	*Tissue Builders*	*Regulators of Body Processes*
Organic group	Proteins	Carbon	"	"	"
		Oxygen			
		Hydrogen			
		Nitrogen			
	Carbohydrates	Carbon			
		Hydrogen	"		"
		Oxygen			
	Fats	Carbon	"		"
		Hydrogen			
		Oxygen			"
Inorganic group[1]	Water, H_2O	Hydrogen			"
		Oxygen			
	Mineral salts	Comprised of the remaining chemical elements			

SOURCES OF FOODSTUFFS

The foods commonly used in human nutrition are drawn from various sources of both animal and plant life, as may be seen in Table II. The three substances belonging to the organic group of foodstuffs are all utilized by the body as fuel. The chief source of body fuel, however, may be said to be plant life. From sugar-cane and sugar beets a pure form of carbohydrate is obtained.

[1] The chemical elements as combined in the inorganic group do not furnish energy or build tissue, but since they enter into and assist the organic group in every function which they perform they are classed with that group as food.

This cane sugar (sucrose) is found to a less extent in the juices of the sweet fruits and vegetables, such as oranges, grapes, apples, plums, corn, peas, etc. This is the form in which the carbohydrate circulates through plants. Starch, another form of pure carbohydrate, is the form in which that foodstuff is stored in plants. It is found widely distributed in cereal grains, rice, potatoes and other tubers, such as taro, which resembles the yam of the southern part of the United States, and tapioca from the manioc root. Bananas, dried beans, peas, and chestnuts also contain starch, although not in such quantities as in the just-mentioned foods.

The fats, coming next to the carbohydrates as a source of body fuel, are obtained from olives, cotton seed, peanuts, almonds and other nuts, and cocoa beans. The amount of fat in other vegetables is very small.

The proteins found in vegetables, grains, and nuts are distributed in varying amounts. The legumes — beans, peas, lentils, and peanuts — contain the largest amount, the cereal grains the next largest, and the nuts, such as almonds, pecans, walnuts, and filberts, still less. Other plants contribute a small amount of protein, but not enough to be greatly considered. Within the animal organism plants are made over into body protein and utilized as such in the food of man.

The fats and **proteins** belonging to animal life are in more concentrated form than those found in plants. The muscular tissue is made up of several kinds of protein, such as albumens, globulins, etc.; the glandular organs of other types, such as nucleoproteins; while the blood is made up of soluble albumens, hemoglobins, globulins, etc. Milk contains a still different type of protein, known as casein, and eggs contain both pure albumens (the white part) and vitellin (the yolk). The brain contains phosphoprotein, a simple protein with some undefined phosphorus-containing substance, and lecithoproteins, compounds of the protein molecule with lecithins.

Since protein is such a very important substance, being, as it is, the only foodstuff capable of building and repairing tissue, it is

well for the nurse to recognize the more important proteins and to know from what source they are derived. The following table shows some of the more important ones:

TABLE II[1]

Vegetable Proteins	*Source*	*Animal Proteins*	*Source*
Gliadin*	Wheat	Casein*	Cow's milk
	Rye	Lactalbumen*	Cow's milk
	Cotton seed	Myosin*	Lean meat
Globulin*	Squash seed	Ovovitellin*	Egg yolk
	Wheat	Albumen*	Egg white
Glutelin*	Maize	Hemoglobin*	
Zein	Maize	Gelatin	Bones
Glycinin	Soy bean		Connective tissue tendons
Excelsin*	Brazil nut		Collagen
Edestin*	Hemp seed		
Hordein	Barley		
Legumen	Beans		
	Peas		
	Lentils		
	Peanuts		

It must be understood that most of our food materials are made up of more than one of the foodstuffs. Beef, for example, contains bones (refuse), water, protein, fat, and ash. The following table shows the percentage composition of 100 pounds of beef.

TABLE III

COMPOSITION OF BEEF

Refuse Per Cent	*Water Per Cent*	*Protein Per Cent*	*Fat Per Cent*	*Ash Per Cent*
16.0	53.0	15.4	15.0	0.6

[1] The proteins marked with a star are capable of producing growth, while those without must have growth-producing substances added, because alone they can merely maintain the body. According to Mendel, animals nourished on these deficient proteins "for over long periods exhibit an interesting type of stunted condition resembling properly nourished younger animals which have obtained the same body weight." Fortunately, however, the animals dwarfed in this way from insufficient proteins have not lost the power to grow.

COMPOSITION OF BEEF

Refuse	*Edible Portion*			
Per Cent	*Water Per Cent*	*Protein Per Cent*	*Fat Per Cent*	*Ash Per Cent*
16.0	62.9	18.3	17.9	0.7

In interpreting the above tables it is important to note the form in which the data are given. "In the above examples, since the beef contains 16 per cent refuse and 84 per cent moist edible material, the percentage of protein or fat in the material as purchased divided by 0.84 gives the percentage in the edible portions; and the percentage in the edible portion multiplied by 0.84 gives the percentage in the material as purchased." [3]

The following table shows where the foodstuffs are found. This is given to facilitate the formulation of a diet. A table containing the chemical composition of the food materials will be found at the end of this section.

TABLE IV

SHOWING THE CHEMICAL COMBINATIONS, AND THE SOURCES FROM WHICH THEY ARE DRAWN

Proteins . . .	Milk, cheese (especially skim-milk cheeses). Eggs. Meat (lean meat in particular). Poultry, game. Fish. Cereals, corn, wheat, rye, oats, etc. Bread and breadstuffs (crackers, pastry, macaroni, cake). Beans, peas, lentils. Cotton seed. Nuts. Gelatine.

[3] The above tables and explanation are quoted from "Chemistry of Food and Nutrition," by Henry Sherman.

Carbohydrates	Wheat products (bread, cake, crackers, pastry, macaroni, spaghetti). Cereal grains, breakfast foods. Corn products, corn meal, green corn. Rice, sago, tapioca, taro. Potatoes (white and sweet). Starchy fruits (bananas). Sweet fruits (oranges, grapes, pineapples). Dried fruits (prunes, dates, raisins, currants). Sugar cane, sorghum cane. Sugar beets, sugar maples. Products made from sugar (candy, jellies, preserves, marmalade).
Fats	Butter, cream, cheese. Olive oil, cotton seed oil, peanut oil, corn oil, almond oil. Soy bean. Corn meal, cotton seed meal and flour, oatmeal. Pork (bacon especially), other fat meat. Codfish (and other fatty fish). Eggs (yolk). Cocoanut, chocolate. Brazil nuts, almonds, pecans, and other nuts rich in fat.
Water	All foodstuffs except those which have been put through a drying process.
Mineral salts (organic form)	Nitrogen (in proteins, meat, eggs, milk, fish, gluten of wheat, zein of corn meal, legumen of beans, peas, and lentils). Phosphorus (eggs, yolk especially, cream, vegetables, whole wheat, cereals, breadstuffs, oatmeal, dried beans and peas).
Iron (organic and inorganic form)	Eggs, milk, lean meat, cereal products, whole wheat, dried beans and peas, vegetables, spinach in particular, onions, mushrooms, fruits, port wine.
Calcium (organic and inorganic form)	Milk.[4] Eggs. Soft tissues and fluids of all animals, skeleton and teeth of animals. Wheat (the entire grain), flour, oatmeal, polished rice. Dried beans and peas. Green vegetables (beets, carrots, parsnips, turnips, potatoes). Fruits (apples, bananas, oranges, pineapples, dried prunes). Nuts (almonds, peanuts, walnuts).

[4] One quart of milk contains more calcium than a quart of clear saturated solution of lime water.

Sulphur (organic and inorganic form)	The proteins	Lean beef, eggs, milk. Wheat flour, entire wheat, crackers, etc. Oatmeal. Beans, peas. Potatoes.
Sodium, potassium, magnesium, iodine, chlorine	These elements are associated with the other mineral salts in foods, and a diet in which they are adequately supplied furnishes sufficient magnesium, potassium, chlorine, sodium, and iodine for the general needs of the body.	

SOURCES AND CHEMICAL COMPOSITION OF FOOD

Before it is possible to understand the effect of food in the body, it is necessary to understand the chemical combinations themselves. The outline just given shows the grouping of these combinations, but a brief description of each will be found essential to insure an intelligent study of the subject.

Organic Foodstuffs: Carbohydrates, Fats, and Proteins

"The carbohydrates include the simple sugars and all those more complex substances (such as dextrin, starch, etc.) which by hydrolysis can be resolved into simple sugar." [5]

There are nine carbohydrates which are of particular interest, since they are most important in human food and nutrition. These are grouped as follows:

Monosaccharides $C_6H_{12}O_6$	Glucose. Fructose. Galactose.
Disaccharides $C_{12}H_{22}O_{11}$	Sucrose. Maltose. Lactose.
Polysaccharides $C_6H_{10}O_5$	Starch. Dextrin. Glycogen. Cellulose.

The monosaccharides, always containing six carbon atoms, are very soluble and digestible. Of these simple sugars, **glucose** will be found widely distributed throughout plant life, and to a less extent in that of animals, where it forms an essential part of the

[5] Quoted from "Chemistry of Food and Nutrition," by Henry C. Sherman.

blood (0.1%). It is abundant in grapes, constituting more than half the solid matter. Onions, sweet corn, and unripe potatoes also contain appreciable amounts of this sugar. Glucose may be obtained by hydrolysis of many carbohydrates, either with enzymes or acids.

Fructose is more or less associated with glucose in fruits and plant juices and is particularly abundant in honey, constituting about half of the solids of that substance.

Galactose, unlike the other two sugars belonging to the monosaccharides, is not found free in nature, but is the result of enzymic action upon milk sugar. A like result is obtained by the hydrolysis of milk sugar by acids. The monosaccharides are susceptible to alcoholic fermentation and have a common function of producing glycogen in the body and hence being utilized by the body for the maintenance of the normal glucose content of the blood.

The **disaccharides** with which we are most familiar and with which we are chiefly concerned in food and nutrition are **sucrose, lactose,** and **maltose.** These three sugars are found widely distributed in nature, being abundant in the sweet fruits and also in many vegetables. Sucrose, or cane sugar, is found in the sugar and sorghum canes, in sugar beets, sugar maples, sugar palms, also in carrots, sweet potatoes, and other vegetables, and in pineapples and other fruits. This sugar is readily hydrolyzed by acids or by the inverting enzyme sucrase in the intestinal juice, the end product being fructose and glucose. Lactose, or milk sugar, occurs in the milk of all mammals; the end products resulting from the hydrolysis of this sugar by either acids or lactase, the hydrolytic enzyme in the intestinal juice, are glucose and galactose. Maltose, or malt sugar, is produced by the diastatic action of certain enzymes upon starch. It is formed during the germinating process of cereal and malt products. It is also formed during the process of digestion by the action of the salivary enzyme ptyalin and the pancreatic enzyme amylopsin upon the starch in food.

The **polysaccharides** are complex in character, being built up of

many sugar molecules, and upon digestion must be broken down into the simple sugars before they can be utilized by the body. **Starch** is the form in which the plant stores her supply of carbohydrates. It will be found in this form in roots and (mature) tubers, three-fourths of the bulk of which is made up of this material. From one-half to three-quarters of the solids of grains is made up of starch also. Pure starch is a fine white powder, odorless and almost tasteless. It is insoluble in cold water and alcohol, but changes from an insoluble substance to a more soluble one upon the application of heat, dextrin. In warm water, starch granules swell as they absorb the water; and finally, with a continuation of the heat, the starch passes into a gelatinous form, or starch paste. Upon hydrolysis starch gives first a mixture of dextrin and maltose, then glucose alone as the end product. This hydrolysis may be the result of enzymic action, as occurs upon bringing starch in contact with the ptyalin in the saliva, or with the amyloptic enzyme in the pancreatic juice; or it may be the result of boiling starch with acid, as is seen in the manufacture of commercial glucose. **Dextrin**, as has already been stated, is an intermediate product of the hydrolysis of starch by acid, or enzymes of digestion. **Glycogen** is the form in which carbohydrates are stored in the body, just as starch is the form in which they are stored in plants. It is found in all parts of the body, but is especially abundant in the liver. Here it is stored in the cell substance rather than in the nucleus. The storage of glycogen in the human body depends largely upon the mode of life and upon the diet. Active muscular work, especially out of doors, uses up the stored glycogen with great rapidity, while rest and a sedentary life promote its storage. The body readily converts its supply of glycogen into glucose, the form in which the body uses the carbohydrates for fuel. **Cellulose** is a woody, fibrous material insoluble in water and to a certain extent impervious to the action of the digestive enzymes. This carbohydrate constitutes the skeleton of plants just as the bones constitute that of the animal body. Formerly it was believed that the cellulose in food was a waste product in the body, more or less useful on account of the bulk

which it lent to the food mass in the intestines but wholly useless as a food. Recent experiments, however, have proved this theory more or less incorrect, since much of the cellulose eaten is broken down and converted into glucose and utilized by the body for the production of energy in the same way that any other carbohydrate is used. However, it is doubtless true that this food material requires a longer time for digestion, and much of it escapes oxidation entirely. Hence it passes down the alimentary canal into the feces, thus promoting peristalsis along the entire tract.

FATS

The fats are derived from both animal and vegetable life, and, like the carbohydrates, are utilized by the body for the production of energy and its by-product, heat. They are the most concentrated of the fuel foods, and again, like the carbohydrates, are composed of combinations of carbon, hydrogen, and oxygen. The oxygen atoms in this group, however, occur in much smaller numbers than in the sugars and starches. The chemical structure of the fats shows that no matter how many hydrogen and carbon atoms a particular fat may contain, there will never be more or less than two oxygen atoms. This constancy of the oxygen atoms furnishes the chief characteristic of this organic food compound. The fats are defined as combinations of fatty acids and glycerin; that is, when a fat is brought into contact with either the lipases of digestion, or with strong reagents, it breaks down into these two constituents. No two fats are alike; they may contain practically the same fatty acids, but they will be in different proportions. Hence it is believed that it is to these substances that each fat owes its characteristic individuality. It is believed that fats owe their flavor, odor, and color to substances which occur in minute quantities with the fatty acids and that if the fats were sufficiently refined they would be, with the exception of butter, odorless, tasteless, and colorless.

Types of Fatty Acids. — The **fatty acids** with which we are particularly concerned in nutrition are: *Butyric Acid, Palmitic*

Acid, *Stearic Acid*, and *Oleic Acid*, but there are many others which occur in combination with those just mentioned. Butyric acid is the substance from which butter derives its name and flavor. It is the characteristic fatty acid of butter fat, forming from five to six per cent of the fatty acids of that substance. Butyric acid is found also in very small quantities in several other fats. Stearic acid (stearin) is found in most fats, and is especially abundant in the more solid varieties and those having a high melting point, such as beef tallow and suet. In fact, it is to this fatty acid that these fats owe their solidity. Butter contains stearic acid, but since there are also several other fatty acids present it does not have the solidity of tallow or suet. Many of the compound butter mixtures or butter substitutes are combinations of fats high in stearin and those of oily nature, the stearin being added to give solidity to the mixture. Palmitic acid is also classed among the more solid fats and occurs abundantly in the fats of both animal and vegetable origin, including many of the fatty oils and waxes, such as spermaceti and beeswax. Oleic acid (olein) is found in most of the fats and fatty oils. It is one of the most important of the fatty acids, constituting as it does the greater part of the typical oils, such as olive oil, cottonseed oil, and lard.

Phosphorized Fats: Lecithins, lecithans, etc., occur in large quantities in the brain and nerve tissues, and to a less extent in other tissues. Egg yolk is the food material conspicuous for its high percentage of phosphorized fat.

Volatile Oil. — These substances are not to be classed as true fats, having little in common with those substances. A few of the volatile oils, such as oil of bergamot from orange peel, and oil of lemon from lemon peel, are used as flavoring agents.

Sources of Fat. — The chief sources of fat in nutrition are milk and milk products, such as butter, cream, and cheese; meats, such as pork (bacon, lard, salt pork) and other fat meats; and fatty fish, such as codfish; beef, beef suet, and tallow; mutton tallow and suet; oily nuts, such as almonds, peanuts, pecans, etc.; and certain seed, such as cotton seed, olives, corn, etc.

Physical Peculiarities of Fats. — It may not come amiss to understand some of the physical peculiarities of this class of food materials; hence a brief account of a few of these is included here. All true fats will soak readily into many materials, causing what is known as a grease spot. A drop of oil or other fat upon a piece of paper leaves a translucent spot which does not evaporate upon standing. This is the simplest test for true fats. Volatile fats leave only a temporary grease spot which evaporates eventually. Fats are not soluble in water, but are so in ether and to a certain extent in alcohol.

Emulsions are compounds of a fluid and a fat. The fat in these substances is not dissolved, but is held in suspension by reason of the microscopic division of the fat globules. Such mixtures are opaque in character. Milk is the best known of the natural emulsions. In order for emulsion to be formed it is necessary that there be present in the solution some substance other than the fat which will coat the surface of the fat globule and prevent it from mingling with other globules. This substance is sometimes a protein, as in milk.

Cleansing fluids, such as benzine, gasoline, naphtha, chloroform, etc., owe their cleansing properties entirely to their ability to dissolve fats.

PROTEINS

All foods which are capable of supplying the body with fuel are composed of combinations of carbon, hydrogen, and oxygen. Science has proved that the most efficient of fuel foods are those classed as carbohydrates and fats. However, it must be kept in mind that there are other needs just as vital as that of the production of energy, namely, that of building and repairing the tissues.

The wear and tear of the body is continuous, hence it is clearly seen that unless some substance is supplied to make good these losses life will inevitably cease. The only element which is known to have this property is **nitrogen**, and the proteins have the entire monopoly of this element for the body. Other substances, both

organic and inorganic in form, such as the essential oils, nitrogenous fats and alkaloids, as well as the nitrogenous extractives, ammonium salts and nitrates, represent a certain percentage of nitrogen in the body, but it is to the proteins that the tissue building and repairing is relegated. Protein is the name given to a number of simple substances all containing nitrogen. These substances are known as **amino acids**; there are about seventeen of these acids with which we are concerned as making up the common proteins, and it has been estimated that millions of different combinations can be made by using even one representative of each of these units. "Hence," to quote Dr. Rose,[6] "we have milk, meat, fish, eggs, cereal and vegetable proteins, all built from the same building stones or the same letters of the protein alphabet, containing therefore all the essentials for constructing different kinds of body protein, as circumstances may require." "Such proteins are called 'complete.'" Another group of proteins, while containing some of the essential amino acids, lack others, so that they cannot be used under all circumstances. In children, for example, there is the element of growth which must be accounted for, and science has made it clear that growth can be brought about only by the giving of a diet composed of foods containing complete amino acids. The best examples of the incomplete amino acids may be found in gelatine and certain vegetable proteins found in beans and peas.

A brief description of some of the more important proteins with which we are chiefly concerned will serve to simplify the formulation of a diet. Those assuming the most important position in nutrition and food are **globulins**, **albumens**, **nucleoproteins**, **phosphoproteins**, **hemoglobins**, and **derived proteins** such as proteoses and peptones. The albumens and globulins associated together occur both in the tissues of animals and in plants. The albumens are richer in sulphur than the globulins and are found more abundantly in the animal fluids, such as the blood, while the globulins predominate in the more solid tissues of animals and in plants. The close association of these two proteins is particularly

[6] Quoted from "Feeding the Family," by Mary Swartz Rose.

noticeable in the blood and cells. They have different characteristics, however. The albumens are soluble in pure water, while the globulins are not. Alcohol-soluble proteins are important because they constitute the principal part of the protein of the cereal grains. Wheat flour, for example, is composed largely of two proteins, glutenin and gliadin, which combine to make up the gluten of wheat. Bread owes its elasticity to the gluten, hence the palatability of the loaf is determined by the proportions of gliadin and glutenin present. Analyses made of bread and of flour have proved that the best bread is produced from flour composed of twice as much gliadin as glutenin.

Albuminoids. — These substances represent one group of incomplete proteins, inasmuch as they cannot alone support protein metabolism. However, they are classed with the proteins and may be substituted for at least a part of these compounds in the daily dietary, since they are able to do much of the work of the pure proteins. The best example of this group is seen in gelatine. This substance contains many of the structural units of meat protein but in very different relative amounts. It has not, therefore, the chemical units necessary to repair the worn-out parts of cell machinery.[7]

Nucleoproteins are abundant in the highly nucleated cells of the glandular organs, such as the pancreas, the liver, and the thymus gland. They are composed of a simple protein with nucleic acid. Under the influence of gastric digestion these compounds split to the two constituents protein and nuclein. Nucleic acid is rich in phosphorus and upon decomposition yields some of the purin bases (xanthin, adenin, guanin, etc.), a carbohydrate, and phosphoric acid.

Phosphoproteins, as has been already described, are compounds of simple proteins with some form of phosphorus. The best examples of these proteins are found in the yolk of egg, where it occurs as ovovitellin, and in the casein of milk.

Hemoglobin, composed of simple proteins with hematin or like substance. This is one of the important constituents of the blood,

[7] "The Basis of Nutrition," by Graham Lusk.

acting as a carrier of oxygen from the air by way of the lungs to the tissues.

WATER

This chemical combination, belonging to the inorganic food group and unable to furnish the body with fuel or build and repair its tissues, is nevertheless equally as important as any of the other foodstuffs belonging to the organic group because of its entrance into every tissue, organ, and function of the body and of food. Man can exist for days, even weeks, without food, but without water life is soon extinct. This substance is composed of hydrogen and oxygen in the proportion of two to one; that is, to each atom of oxygen there will be found two atoms of hydrogen. This is always the case no matter where it is found. When foods are put through a drying process the water is taken out and the rest of the chemical composition of the food remains unchanged.

MINERAL MATTER

Ash. — The eight remaining chemical elements, *i.e.*, calcium, magnesium, sulphur, iron, sodium, potassium, phosphorus, chlorine, constituting the mineral salts or ash, are likewise classed as food on account of the work which they perform in the body. Some of these elements enter the body as essential constituents of the organic compounds, and are metabolized in the body as such, becoming inorganic only upon oxidation of the organic materials of which they form a part.

Those which may be mentioned as such are iron, sulphur, and phosphorus. Other elements belonging to this group both enter and leave the body in the same inorganic form. Physiological chemists are proving more and more the importance of the ash constituents in human nutrition, hence it is necessary for the nurse to know just where these elements can be found and in what form they are distributed. For this purpose the following table, compiled from one arranged by Sherman,[8] is included:

[8] "Chemistry of Food and Nutrition," p. 332, by Henry Sherman.

TABLE V

Ash Constituents of Foods in Edible Portions[9]

Food	*CaO*	*MgO*	K_2O	Na_2O	P_2O_5	*Cl*	*S*	*Fe*
Apples	.014	.35	.15	.02	.03	.004	.005	.0003
Asparagus	.04	.02	.20	.01	.09	.04	.04	.0010
Bananas	.01	.04	.50	.02	.055	.20	.013	.0006
Barley (pearled)	.025	.10	.35	.04	.46	.02		.0013
Beans (dried)	.22	.25	1.40	.26	1.14	.03	.22	.0070
Beans (Lima)	.10	.31	2.1	.33	.77	.025	.16	.0070
Beans (fresh)	.04	.11	.7	.12	.27	.009	.06	.0025
Beans (string)	.075	.043	.28	.03	.12		.04	.0016
Beef								
Beer	.007	.010	.059	.059	.089	.014		
Beets	.03	.033	.45	.10	.09	.04	.015	.0006
Blueberries	.045	.015	.05		.02			
Blackberries	.08	.035	.20		.08		.01	
Bread, white	.03	.03	.10		.20		.12	.0009
Bread, wholewheat	.04	.08	.27		.4			.0015
Butter	.02	.001	.02		.03			
Buttermilk	.15	.026	.18	.08	.22	.10		
Cabbage	.068	.026	.45	.05	.09	.03	.07	.0011
Cocoa	.14	.48	1.	.05	1.1	.04		.0024
Carrots	.077	.034	.35	.13	.10	.036	.022	.0008
Cauliflower	.17	.02	.27	.10	.14	.05	.085	
Celery	.10	.04	.37	.11	.10	.025		.0005
Cheese	1.1	.06	.2	1.	1.45	1.		
Cheese (cottage)	.3	.015			.5			
Chocolate	.14	.48			.90			
Cocoanut	.09	.10	.77	.10	.38	.25		
Codfish	.2							
Coffee	.25	.42	2.3	.08	.054	.04		
Corn (fresh)	.008	.055	.137	.05	.22	.014	.044	.0008
Cornmeal	.015	.13	.17	.03	.3		.116	.0011
Crackers	.025	.017	.12		.23		.12	.0015
Cream	.14	.02	.15	.06	.18	.1	.03	.0002
Cucumbers	.022	.015	.17	.015	.08	.03	.022	
Dandelion greens								.0027
Dates	.10				.12			.003
Eggs	.093	.015	.165	.2	.37	.10	.19	.003
Egg, white	.015	.015	.19	.21	.03	.15	.196	.0001
Egg, yolk	.2	.02	.13	.1	1.0	.1	.157	.0085
Figs, dried	.299	.145	1.478	.064	.332	.056		.0032
Fish (halibut)	.013				.4			.0003
Grapefruit	.03	.02	.17		.04	.01		.0004
Grapes	.024	.014	.25	.03	.12	.01	.024	.0013
Grape juice	.021	.016	.20	.01	.04	.01		

TABLE V — *Continued*

Food	*CaO*	*MgO*	K_2O	Na_2O	P_2O_5	*C*	*S*	*Fe*
Honey	.005	.03	.5		.04	.03		.0010
Lamb								
Lemon juice	.033	.01	.17	.01	.025	.01		
Lentils	.12	.05	.75	.25	.66	.08		.0086
Lettuce	.05	.01	.42	.04	.09	.06	.014	.001
Meat [10]								
Lean beef	.011	.04	.42	.09	.50	.05	.20	.0038
Lean veal	.016	.045	.46	.12	.50	.07	.23	
Chicken	.015	.06	.56	.13	.58	.06	.216	
Lean pork	.012	.046	.34	.13	.45	.05	.20	
Milk	.168	.019	.171	.068	.215	.12	.033	.00024
Molasses	.9	.3	1.7	.3	.2	.2		
Oatmeal	.13	.212	.458	.109	.872	.035	.215	.0036
Onions	.06	.03	.23	.02	.12	.02	.06	.0005
Oranges	.06	.02	.22	.01	.05	.01	.013	.0003
Orange juice	.05	.02	.22	.01	.03	.01		
Parsnips	.09	.07	.70	.01	.19	.03		
Peaches	.01	.02	.25	.02	.045	.01	.01	.0003
Peanuts	.10	.28	.85	.07	.90	.04	.243	.0020
Pears	.021	.019	.16	.03	.06			.0003
Peas (dried)	.04	.07	.30	.04	.26	.01	.06	.0016
Pineapple	.02	.02	.38	.02	.06	.05		.0005
Potatoes (sweet)	.016	.036	.53	.025	.140	.03	.03	.0013
Rhubarb	.06	.02	.39	.03	.07	.035		
Rice	.012	.145	.084	.028	.203	.05	.105	.0009
Spinach	.09	.08	.94	.20	.13	.02	.041	.0039
Squash	.02	.01	.05	.05	.08	.01	.026	.0008
Strawberries	.05	.03	.18	.07	.064	.01		.0009
Tomatoes	.020	.017	.35	.01	.059	.03	.02	.0004
Turnips	.089	.028	.40	.08	.117	.04	.07	.0005
Turnip tops	.48	.05	.37	.11	.11	.17	.07	
Wheat flour	.025	.027	.146	.04	.20	.07	.17	.0013
Wheat bran	.14	.84	1.5	.07	3.		.26	
Wine	.012	.019	.100	.018	.036	.01		

VITAMINES

Before leaving the subject of the foodstuffs, it is necessary to make some mention of the accessory food substances known as vitamines. It is a fact well known to science that the human body

[9] Compiled from Sherman's "Chemistry of Food and Nutrition," and other sources.

[10] Average meat is calculated to contain per 100 grams protein .075 CaO, .2 MgO, 2.0 K_2O, .4 Na_2O, 2.3 P_2O_5, .2 Cl, .9 S, .015 Fe.

needs something more than absolutely pure protein, fat, carbohydrate, and mineral salts. When these foodstuffs are too highly refined they seem to lose some vital quality which alone produces growth. It is only recently that these substances have been recognized and studied. That they exist in minute quantities in a number of foods is certain, but very little is really known as to their exact character. It is only known that if a young animal is given food deficient in these so-called vitamines he will cease to grow. Certain nutritional diseases are believed to be due to an absence of vitamines in the food of the individual. In certain countries the disease beri-beri was prevalent, and upon investigation it was noted that those suffering from the disease subsisted upon rice from which the outer husk had been removed. Rose [11] states that individuals restricted to a diet of cooked and dried rations, especially if limited in variety, run a risk of developing scurvy, one of the diseases also considered to be due to a lack of vitamines in the diet. According to Lusk,[12] there are certain classes of vitamines existing in the vegetable kingdom which are necessary for the normal growth and nutrition of animal tissue, and since they become a part of the tissue it would be unnecessary to eat the vegetable if the meat were eaten. It has been said that there is a deficiency of the neuritis-preventing substances in the composition of sweet potatoes, Irish potatoes, and some of the breakfast foods, and that meat sterilized at a high temperature will also lose these substances. There has been more or less discussion as to the advisability of sterilizing, by boiling, milk to be used in the feeding of infants, since there is a liability of the vitamines being destroyed if they are subjected to this degree of temperature. In America it is not probable that adults under normal conditions will confine themselves to a diet deficient in vitamines. Hence we run few chances of developing scurvy or beri-beri, but babies kept upon a diet consisting of dried prepared foods and milk which has been boiled run a risk of developing scurvy, which is, according to many authorities, directly due to the absence of these accessory food sub-

[11] "Feeding the Family," Mary Swartz Rose.
[12] "Fundamental Basis of Nutrition," Graham Lusk.

stances. The addition of fresh foods,[13] especially fruits and vegetables such as oranges, lemons, potatoes, and cabbage, will prevent or even cure these diseases should they chance to develop.

A brief description of the foods especially valuable in the invalid dietary may be useful to the nurse in the formulation of diets in different pathological conditions.

Eggs. — The table shows eggs to have a chemical composition of water 73.7%, protein 14.8%, fat 10.5%, and mineral salts (ash) 1.0%. Fuel value per pound, 672 calories. The white of the egg, constituting 57% of the entire weight, is composed chiefly of albumen and water with a small percentage of mineral salts in the form of calcium, potassium, magnesium, sodium, phosphorus, chlorine, sulphur, and iron. Typical albumens are always rich in sulphur, and in eggs the sulphur content is much greater in the egg white than it is in the yolk. The yolk of eggs contains more protein and fat than the white, and less water. The protein of the yolk is chiefly in the form of ovovitellin, while the fats occur as palmitin, olein, and stearin. There is also 5% of coloring matter in the yolk of eggs besides lecithin, nuclein, salts of iron, potassium, magnesium, and phosphorus. The latter mineral salt comprises 1.0% in yolk, while in the white there is only .03%. Eggs have a position in the invalid dietary second only to that of milk. They are nutritious, easy of digestion, and exceedingly palatable if properly selected and correctly prepared. The albumen in the white is very susceptible to the effect of heat. At a temperature of about 135° F. the clear, pale yellowish white begins to change to an opalescent tint, and, as the temperature is gradually increased, the texture changes from a viscid, sticky substance to an opaque, jellylike mass which solidifies with an ever increasing temperature. Hard cooked white of egg, unless it is very finely divided, is considered difficult of digestion, but if the heat is applied gradually and is not raised to the boiling point (212° F.) there is no reason why the hard cooked white of the egg should not be digested. However, it is unwise to cook eggs in this manner for invalids or children. Any of the other methods, with the exception of frying,

[13] See "Treatment of Scurvy," p. 201.

which should never be used, is decidedly preferable. Egg albume is soluble in water and fresh fruit juices, so that it may be use with great success as a reinforcing agent. In fact, the whole eg may be so used, but it is more difficult to disguise the yolk in beverage than it is the white, and for this reason it is not so adapt able in many cases. Eggs may be cooked by the following methods in the invalid dietary: coddled, soft cooked, poached, creamed, omelet, scrambled, or in custard. Uncooked eggs may be given in water, milk, wine, or fruit juices.

Meats. — The flesh of animals, poultry, and fish comes under the head of meat. These food materials form one of the most important sources of protein in the diet, the foodstuff being in concentrated form easily handled by the digestive apparatus and absorbed almost completely, leaving little residue in the intestinal tract. The chemical composition of different meats is very much alike, as will be seen in the table, the bulk of the weight being water, while the proteins range from 18.3% (E.P.)[14] in beef to 9.9% in bacon. The fats range from 17.9% in beef to 64.8% in smoked bacon.

The mineral salts or ash, as they are found in meat: "Sodium occurs in the animal body chiefly as chloride in the fluids and blood, and to a less extent in the other tissues." "Potassium, on the other hand, is much more abundant in the soft solid tissues, in the corpuscles of the blood and the protoplasm of the muscles and other organs." "Potassium sulphate in the blood reacts to some extent with sodium chloride, forming potassium chloride and sodium sulphate, both of which are rapidly eliminated by the kidneys." The greater part of the sulphur with which we are concerned in nutrition enters the body by way of the protein, the percentage in lean beef being from 0.95% to 1.00%.[15] Phosphorus in meat occurs as phosphoprotein in the nucleoproteins of cell nuclei, and lecithoproteins in the brain and to a less extent in other tissues as phosphorized fats. Meat is poor in calcium, containing only about 0.01 gram per hundred grams of substance.

[14] Edible Portion.

[15] "Chemistry of Food and Nutrition," by Henry Sherman.

Meat with eggs yields a considerable amount of what is known as acids in the body, while milk shows a predominance of base-forming elements.[16]

The **cereal grains** contain appreciable amounts of protein, carbohydrates, and, to a less extent, fat (see table). The cereal grains contain all of the foodstuffs. The proteins, however, are not in every case as available in nutrition as those contained in milk, meat, and eggs.[17] From grain is made the grits, meal and flour, also the so-called "breakfast foods" or cereals. The protein content of the different grains ranges from 12.4% and 12.5% in barley and wheat to 7.4% and 9.7% in rice and corn, while the fats run much lower in all the grains, those containing the largest amount being oats, with a percentage of 5, and the lowest being rice, which has a content of 0.4%. The carbohydrates predominate over all of the other foodstuffs in grains, wheat containing 71.2%, rice 79.2%, oats 59.7%, corn (maize) 74.9%, and barley 69.8%. This type of food material forms a large part of the average dietary, constituting the basis of bread, cake, pastry, macaroni, spaghetti, noodles, crackers, etc.; also the breakfast foods, such as oatmeal, wheatena, malted breakfast foods of different kinds, hominy, grits, samp, and the ready-to-eat breakfast foods, such as corn-flakes, wheat berries, puffed rice, etc.

In a former chapter the effect of heat upon starch as it occurred in food was discussed. It is well, however, to lay particular stress upon the necessity for subjecting those foods high in cellulose to a long-continued cooking, at a lower temperature than that used for foods equally high in starch but containing less cellulose. In the latter foods the starch grains come in contact with the heat more quickly and more effectually than those surrounded by a tough layer of woody fiber, which needs to be broken down before the full effect of the elevation of temperature can bring about the desired change in the starch itself. In the preparation of foods containing starch for invalids and infants this attention to the chemical change in the starch is especially essential. The fuel

[16] The effect of meat, eggs, and milk in the body will be dealt with in Section 2.
[17] See description of important proteins, p. 13.

value of the grains is high. The table on page 144 shows the calories produced in the body from the oxidation of the grains and some of their important products, such as bread, oatmeal, etc.

The **fruits and vegetables** will here be considered. Some of the fruits and vegetables contain high percentages of sugar, aside from the mineral salts, for which they are especially valuable. This class includes the sugar cane, sugar beet, raisins, dates, figs, etc., while others such as the potato, taro, banana, etc., furnish an appreciable amount of starch. All of the vegetables and fruits are rich in mineral salts, which are as important to the work of the body as the proteins, carbohydrates, and fats. Hence it is essential to add the foods containing these mineral salts to the daily dietary either in health or in disease.

The foods prized for their fat content, aside from milk, meat, eggs, and grain, are **olives, cotton seed, peanuts**, etc. The fats from these foods need no especial mention, save to say that in the invalid dietary it is especially necessary to know the amount of fat contained in a food before using it too lavishly, since this foodstuff is more difficult for an impaired digestive apparatus to handle than the others. It is most valuable because it is a concentrated form of energy-producing material and because it is distributed through the entire body, acting as a protection to the organs and giving the human form its graceful contours, but, as has already been stated, the foods containing a high percentage of fat in their composition must be judiciously utilized, otherwise much of their nutrient will not only be wasted in the body through lack of digestion, but may easily bring about conditions more or less serious in character. The fuel value of the foods containing a high percentage of fat will be found in the table already mentioned, on page 144.

Milk. — Milk is without a doubt the most valuable food in the invalid dietary, furnishing not only a highly nutritious beverage, but likewise acting as a carrier of additional nourishment when such is necessary. Its form, its lack of definite flavor and odor, all add to its value as a food in sickness. Milk is one of the few foods which includes in its composition all of the chemical com-

binations known as foodstuffs. The carbohydrates, comprising 4.88% to 5% of the solids in milk, occur as lactose or milk sugar. This sugar belongs to the disaccharide group, and is, in the majority of cases, readily digested by even the most delicate digestive apparatus. This form of sugar lends itself particularly well as a reinforcing agent, and is generally used in such cases as typhoid fever, etc. The fat in milk, comprising 4% of the solids and occurring as butter fat (cream), is made up chiefly of olein and of palmitin, with smaller amounts of stearin and from 5% to 6% of its composition in the form of butyric acid (the fatty acid to which butter owes its name and flavor) and traces of other fatty acids, as well as small quantities of cholesterin, lecithin, and a yellow coloring matter.

PROTEINS

The proteins of milk, which form the curd or larger part of the solids, according to Van Slyke,[18] are in the form of casein and albumen. There are 3.6 parts casein to 1 part soluble proteins, but these figures vary somewhat at times. Casein is insoluble in pure water, but dissolves readily in water to which an alkali or calcium carbonate is added. The soluble protein in the form of lact-albumen is one of the constituents of whey. This substance contains more sulphur than does casein, but no phosphorus.

Whey is the opalescent fluid which remains when the casein is precipitated, and is composed of water 93.8%, total ash 0.44% (Konig).

Mineral salts, 0.7% of milk, are made up of calcium, potassium, sodium, magnesium, iron, sulphur, phosphorus, and chlorine. Milk is so rich in calcium that it requires only 400 c. c. (or about 2½ cups) to furnish 1 gram of calcium. This is the amount believed to be necessary for the welfare of man each day and this must be derived from food.[19]

Water. — The fluid part of milk is composed chiefly of water, constituting 87% of whole milk.

Milk as a food for infants will be discussed in another chapter.

[18] "Archives of Pediatrics," XXII, 515, by Van Slyke.
[19] "Chemistry of Food and Nutrition," by Henry Sherman.

As has already been said, no food has so far been discovered which could be effectually substituted for milk. There is no food, however, which requires more attention in its selection and care. It is very susceptible to both odors and flavors, absorbing them both readily, as will be found if milk be placed in the same compartment with foods of strong odor and flavor, without being properly covered and protected. This is particularly noticeable with cucumbers, melons, etc.

Milk also furnishes a splendid medium for bacterial growth, and if left exposed to the air, put into unclean receptacles, or kept in a warm place, will immediately become more or less contaminated, after which it is unwise to use it. Sterilization and pasteurization will in a measure overcome the bacterial contamination, but milk purchased from a dairy which is not clean or milked under unsanitary conditions will remain dirty, hence unfit for human consumption. When the morning's milk supply is brought to the house it should be in clean, well-stoppered bottles, but before placing it in the icebox the tops of the bottles should be carefully wiped off with a wet cloth to remove any superficial dust which may be adhering to them. Every time a portion of the milk is removed thereafter the tops should be again cleansed before the milk is poured out. This is a wise precaution, and often prevents contamination from the hands, etc.

The amount of water in milk prevents its being an adequate food for adults except in certain pathological conditions. However, it furnishes a supplementary food unequaled by any other beverage known. There are fortunately only a few individuals who are unable to drink milk. There are many who fancy they cannot do so, but if the nurse has the ingenuity to utilize some of the various methods whereby milk is made more digestible, it will generally be found that the patient can take it without trouble. In cases of personal dislike, if the milk is flavored or colored or made up into soup, cocoa, chocolate, junket, custards, blancmange, etc., it will usually prove acceptable.

Application of Heat. — A word as to the changes which are brought about as the result of heat as applied to milk. These

changes are demonstrated in the two methods commonly used in the preparation of milk known as "pasteurization" and "sterilization." Pasteurization is rather an indefinite term to use, unless the time and the temperature to which the milk is subjected is given. According to Morse and Talbot "the term sterilization should never be applied to the processes used in the preparation of milk for the feeding of infants, because the milk is never rendered bacteriologically sterile by them." [20]

As a rule the flavor and odor of milk is not changed by heat until the temperature reaches nearly to the boiling point. A scum then forms on boiling milk, composed of casein 50.86%, fatty matter 45.42%, ash 4.72% (Rosenau). Prolonged boiling changes the color of milk from a creamy white to a yellowish brown which deepens with boiling. This is due to the caramelization of the milk sugar. Cream will not rise (or its rise will be very slow) on milk which has been subjected to a temperature of 150° F. for thirty minutes or more because the fat droplets are broken down so that they cannot hold together at that temperature and become more completely distributed throughout the fluid.[21]

Pasteurization is acknowledged to be preferable to sterilization in milk used for infant feeding because the higher the temperature the greater the change in the chemical composition of the fluid. According to Morse and Talbot [22] the temperature of the pasteurization should be as low as possible. Pasteurization at 140° F. for 20 minutes is sufficient; lower temperatures are not. "At this temperature there is no change in the taste, odor, or color of the milk, no noteworthy changes in the chemical composition are produced, the ferments and bactericidal action are unaffected and bacterial toxins and non-spore-bearing micro-organisms are destroyed." [23]

[20] "Diseases of Nutrition and Infant Feeding," by Morse and Talbot.

[21] Bulletin 56, Hyg. Lab., Public Health Service, 1908; Circular 153, U. S. Dept. Agric., Bureau of Animal Industry, 1910.

[22] "Diseases of Nutrition and Infant Feeding," p. 173, by Morse and Talbot.

[23] Quoted from "Diseases of Nutrition and Infant Feeding," p. 173, by Morse and Talbot.

Rosenau [24] states that the bacillus of typhoid, diphtheria, and dysentery, as well as the cholera vibrio and other pathogenic non-spore-bearing bacteria which are often found in milk, are destroyed at a temperature of 140° F. for twenty minutes, and at higher temperatures for shorter lengths of time.

Sommerfield's [25] investigations prove that butyric acid bacilli are destroyed at a temperature of 212° F. to 216° F. for from 1 to 2 minutes.

It must be understood that no matter what method is used to insure purity in milk, nothing does away with the necessity for keeping the milk both clean and cold. The receptacles in which the milk is allowed to stand, the vessels in which it is measured, and the person who handles it must be absolutely clean, and the nurse must keep in mind the fact that pasteurization does not completely destroy the bacterial growth in milk, that it merely diminishes it, and she must see that the milk which has undergone the pasteurizing process is kept cold, otherwise the micro-organisms which are present, even if to a less extent than in raw milk, will undoubtedly multiply.

Adulteration of Milk. — There is not nearly so much adulteration of milk to-day as there was a few years ago. The stringent laws governing the care and composition of the milk make it unprofitable for the dairymen to practice it. However, there are times when such things are done and care must be taken to prevent it. Milk is, as has already been stated, very susceptible to contamination, and that which is infected with putrefactive bacteria is not fit for food even if the dealer has doctored it with formaldehyde. However, the danger to-day is not so much from drugs as from lack of care in the handling of the milk. It is well to remember, however, that water is an adulteration just the same as formaldehyde and perhaps more pernicious, since the quantities of the latter are so small in an ordinary quantity of milk as not to make a great deal of difference except in the feeding of invalids and

[24] Rosenau: Bulletin 56, Hyg. Lab., Public Health Service, 1909; Circular 153, U. S. Dept. Agric., Bureau of Animal Industry, 1910.

[25] Sommerfield: Handbuch der Milchkunde, J. F. Bergman, Weisbaden, 1909.

children, while watered milk is a swindle not only to the pocket-book but to the body also, since the requisite nutritive value is lacking.

Selection and Care of Milk. — There are a few essential facts to keep in mind in regard to milk: (1) Be sure of the source of the milk supply, especially in the feeding of the sick and of infants. Milk for such cases should always be purchased from inspected dairies when it is possible. (2) Keep the milk cold, the best milk in the world will spoil if left in a warm place. (3) Always keep the milk bottle well covered, thus eliminating the danger of contamination, flies, etc.

Skimmed Milk. — Milk which has had the cream removed is still nutritious, but not so much so as whole milk. Babies fed upon skimmed milk will grow thin unless fat is added in some form.

Buttermilk is milk which has been soured, either naturally by allowing it to stand in a warm place until it is soured and coagulated, or, by adding lactic acid bacteria (Bulgarian Culture) to bring about the souring and coagulation. Buttermilk may be made from whole or skimmed milk, but the latter is thin and watery and less palatable than that made from the milk with the cream left in. Buttermilk is one of the most wholesome forms in which milk can be taken, and for this reason is used largely in the invalid dietary and in the feeding of infants. Koumiss, Matzoon, Zoolak are artificially fermented milk, and are used in the feeding of the sick.

Whey. — Whey is an opalescent solution which remains after the coagulation of casein; it contains the greater part of the lactose, lactalbumen, and ash constituents of milk. Whey being fat free is used as a substitute for part or all of the diluents in the modification of milk for infants under certain conditions specified by the physician.

CHAPTER II

THE SELECTION, CARE, AND ADULTERATION OF FOOD

RULES GOVERNING SELECTION OF FOOD

THERE are certain fundamental rules to be observed in the selection of our food materials, whether they are intended for those in health or for those suffering from pathological conditions. These rules are definite and obligatory. All food materials must be of good quality; that is, they must be of known purity and cleanliness, and adulteration should not be tolerated. In health the small amount of preservative used in certain canned and bottled foods would probably have little if any effect on the individual, but in sickness this is not always the case. With regard to milk, this point has particular significance. To obviate danger, the nurse should use discrimination in the selection of the dealer from whom the meat, milk, eggs, fruit, and vegetables are purchased, as well as the grocer who supplies the remainder of the food materials used by the patient.

Dairy Products. — Milk, cream, and other dairy products form such an important part of the invalid dietary that they require especial care in their selection. "Certified Milk" is the safest. This is protected by special inspection. The methods and standards governing the production and distribution of certified milk were adopted by the American Association of Medical Milk Commissions, May 1, 1912. The sanitary condition of the dairy, the cleanliness of the vessels into which the milk is placed, the health of the milkers, and a surety that no member of their family with whom they come in contact has any kind of contagious disease, are all obligatory. The feed for the cows and the purity of the water given them to drink must be inspected and made to conform to the standard laid down for certified milk. The milk of sick cows and those having tuberculosis is absolutely con-

demned. The composition of certified milk is standardized as follows: The fat standard shall be 4%, with a permissible range varying from 3.5% to 4.5%. The proteins shall be 3.5%, with a permissible range varying from 3% to 4%. Certified milk shall not contain more than 10,000 bacteria to the cubic centimeter when it is delivered. This inspection and standardizing necessarily raises the price of certified milk above that of milk not so rigidly cared for, and when the additional expense makes it impossible for the patient to afford certified milk, the only thing to do is to be sure of the reliability of the dealer from whom the milk is purchased and the cleanliness of the dairy from which it is procured. Buttermilk and butter are the milk products which require some attention as to selection. The former grows sour with age and the odor of advanced fermentation and decomposition is readily recognized. Sweet butter, butter without salt, is less apt to be old when purchased than the salted variety, as the flavor of rancid fat is unmistakable in butter which has not been especially treated.

Vegetables should be fresh and free from blemishes. Those to be served raw, such as lettuce and other salad vegetables, must be purchased from reliable markets. Unscrupulous vendors have been known to sprinkle old wilted vegetables, to restore their freshness, with water from stagnant pools teeming with typhoid bacteria, thereby spreading infection broadcast. Vegetables which require cooking before they are eaten are, for this reason, safer.

Canned foods should be avoided in the diet of the invalid whenever it is possible; but, when it is not, care should be observed that no can is used in which there is the least sign of fermentation. Beans and peas are sometimes artificially colored, but this custom is not so prevalent now as it used to be.

Beverages and **syrups** are used constantly in the feeding of the sick, and for this reason should be selected with the greatest care. The nurse should be cautioned to read the label on every bottle to make sure that it is free from injurious substances. The infinitesimal amount of sulphurous acid sometimes put into beverages to preserve them would not be noticed by the normal individual, but to the patient suffering with gastric disorder even

this small amount may bring about an increased irritability of the mucous lining of the stomach, resulting in acute pain.

The **meats** to be used for the invalid must be selected with care. The quality of this item of food is most important. It is not always necessary to purchase the most expensive cut. If it is to be broiled or roasted then it is necessary to select parts of the animal which are tender, but for broths, soups, scraped or ground meat, or the meat to be used for the juice only, it is wasteful to buy these tender, expensive pieces when those costing less will serve the purpose equally well. The names given to the different cuts vary slightly in different parts of the country, but those in general use only will be mentioned here. The following diagram shows the manner in which the beef is cut and the method in which it is generally used:

TABLE VI

Beef	*Cut*	*Method of Preparation*
Hindquarter	Round: more or less free from fat	Broth, soup, beef juice, scraped beef.
	Round: round steak	Hamburg steak (ground meat) Broiled (this is a cheaper and less tender cut than the loin steaks).
	Rump: steak	Broiled, cheaper cut steak.
	Rump: roast	Roasted, cheaper cut roast.
	Rump: lean meat	Broth, soup, beef juice.
	Loin: 3 ribs, 1st, 2d and 3d; cuts	Roasted.
	Loin: sirloin steak	Broiled.
	Loin: porterhouse steak	Broiled.
	Tenderloin: steak	Broiled.
	Tenderloin: roast	Roasted.
	Tenderloin: fillet	Broiled or roasted, larded or plain.
	Ribs (prime)	Roasted.
	Ribs, chuck roast or steak	Roasted or broiled.
Forequarter	Brisket	Corning. Broth, soup, scraped, meat juice. Hamburg steak. Salisbury steak.

CUTS OF LAMB AND MUTTON

Lamb	Neck	Soup, broth, etc.
	Chuck (including shoulder ribs). Shoulder chops are not so tender as loin chops.	Broiled.
	Flank	Soup, broth.
	Loin (chops)	Broiled.
	Leg	Roasted.
Veal	Neck	Soup, broth.
	Chuck	Soup, broth, roast, broiled.
	Cutlets	Broiled (breaded or plain).
	Chops (rib)	Broiled.
	Breast	Roasted, stuffed or plain.
	Leg	Roasted.
	Hind shank / Fore shank (veal knuckles)	Soup, broth.

Pork in the Diet. — Fresh pork is rarely ever included in the invalid dietary save in diabetic diets. Meat from this animal must always be thoroughly cooked, not only because underdone pork is exceedingly indigestible but because there is an infectious bacterium sometimes found in pork which is only destroyed by thorough cooking of the meat. Well-cooked bacon is digestible if the surplus fat is poured off instead of allowed to soak into the cooked bacon. The most efficient method of cooking bacon is to place the strips upon a broiler under the flame. In this way the hot fat drips down into the pan beneath, leaving the bacon crisp and delicate.

Quality of Meats. — The quality of meat depends upon several factors: *age*, *sex*, care, feeding, and the length of time it is hung. Cold storage beef is much more apt to be tender than that cut from a freshly killed animal. Animals that are not allowed to run over a large area, but are kept in a small inclosure and fed on fattening foods, produce meat of a high quality. This is because the muscular tissue has not been hardened with exercise. The worked muscle is always tougher than the quiet one. For this reason the tenderloin of beef is more tender than the flank. It is situated in the part of the animal that is exercised the least. The tough parts, however, are not lacking in flavor or nourishment,

but the manner in which they must be cooked to assure them of being tender deprives them of much of their original flavor. This is demonstrated in broths and soups made from the tough cuts of meat. The extractives from which meat derives its flavor and the soluble albumens are drawn out by the water, and if it is to be used as hash, croquettes, etc., needs to be seasoned, since the broth, while it has taken very little of the actual nourishment from the meat, has deprived it of practically all of its flavor. In making broth or soup, if the meat is covered with cold water instead of hot, more of the extractives will be drawn out and the broth will be more highly flavored and much more stimulating. The color, odor, and freshness of the muscular and fatty tissues of meat are all indicative of their quality. Fresh meat is firm in texture and free from offensive odor. Stale beef and that cut from an old steer exhales a pungent odor of butyric acid. The color of beef should be dark purplish when fresh cut but this changes quickly to a bright red; it should contain preservatives of no kind and must be cut from animals free from all disease. The fat should be of a yellowish white and be crumbly, and should be distributed throughout the muscular tissue and around the organs.

Veal, being the flesh of an immature creature, is not so highly flavored as the flesh of older animals, but the bones and cartilages are softer, and when this meat is used for broth, more of the gelatine (collagen and elastin from the bones and connective tissue) is dissolved out, giving a slightly higher percentage of nutriment in the broth.

Selecting of Chicken and Turkey. — In selecting chicken for the diet of invalids, use only the young birds for broiling, those a few months older for baking and roasting, and the fowls for soup and broth. To test a chicken for broiling and roasting, select one in which the cartilage at the end of the breastbone is soft and pliable; the pinions (lower part of the wings) and the feet should be soft and readily bent. The breastbone of a fowl is firmer and the wings and feet harder than those of the younger chicken. The young chicken has an abundance of pin feathers while the old fowl has not. In fact, one of the means of differentiating between the

old chicken and the young, even if they are practically of the same weight, is the presence of the long hairs instead of pin feathers. The fowl selected for broth should not be very fat, as this fat will melt into the broth, causing it to be greasy and unpalatable. Turkey, even when it is young, is not quite so digestible as young chicken; the fibers are longer and the connective tissue more abundant. Goose and duck are richer in fat and not so desirable as chicken in the invalid dietary. Squab, quail, and young squirrel are all palatable and readily digested. The squirrel must, however, be young, or the flesh will be tough and more difficult of digestion.

Fish. — Fish should be given consideration in the dietary of the invalid since it is a valuable source of protein and readily digested in the majority of cases. As a rule fish is not so well liked as meat, but since it contains a smaller percentage of **extractives** and **purin** bases it is exceedingly valuable in certain pathological conditions. The lean varieties of fish, halibut, flounder, trout, perch, haddock, turbot, whitefish, are more readily digested than the dark fish, which contain a higher percentage of fat. To this latter class belong the bluefish, mackerel, salmon, shad, and herring.

Shellfish. — Of the shellfish, the oyster and the clam are exceedingly useful. The soft parts of the oyster are palatable and easily digested. They are not highly nutritious, but give a nice variety to the diet. When used in broth or for the juice, clams are particularly useful. Many cases of nausea are relieved by the taking of iced or very hot clam juice when they resist other remedies. The necessity of having both oysters and clams absolutely fresh is of the greatest importance, since a type of poison results from tainted shellfish which is exceedingly dangerous.

Eggs. — The selection of eggs is equally as important as the selection of other foods. There are "new-laid eggs," "fresh eggs," and just "eggs." The latter are generally storage and should not be used for the sick or for infants. As a rule old eggs will not stand poaching, the whites and yolks mingle and form an unappetizing mass. It does not make any difference whether the color of the shell is white or brown; if the egg is absolutely fresh

the white and yolk should be distinct and easily separated, and when they are not it is safer to discard the egg entirely.

THE CARE OF FOODS AND UTENSILS

The next point of consideration is the care of the food materials. This is quite as important as the selection, for even the best of food may be ruined by careless handling, not only in the preparation, but likewise during the period before it is prepared for the invalid's consumption. The rules governing the handling of food materials before they reach the consumer are subject to inspection by law, but the housekeeper or nurse has no such rules to guard or govern her; hence she may be wantonly careless or ignorantly unsanitary unless taught the right way to care for the food in her charge. Perishable fruits and vegetables must be kept in a cool place to preserve their freshness. Milk and milk products, cream, butter, buttermilk, cheese, etc., meat, fish, and, at times, eggs should be kept in a refrigerator or in a cold place such as the cellar in the country, when it is impossible to procure ice.

Broths of all sorts, beef juice, and meat jellies will sour and decompose unless kept close to the ice. Carbonated waters, such as Vichy, Apollinaris, White Rock, etc., as well as champagne and other sparkling wines, must be kept in a dark, cool place, lying on the side. It is better to put only one or two bottles on the ice at a time, since the wine flattens (loses its sparkle) if it is ever allowed to become warm after once being placed on ice. Koumiss and other fermented milk products must be treated in a like manner to assure having them served at their best.

Absorption of Odors and Flavors. — Milk, cream, and butter are very apt to absorb the flavor or odor from any strong odored substance if placed in the same compartment in the ice-box. This is found to be particularly objectionable when melons, cucumbers, or onions are placed in close proximity in the refrigerator with milk, cream, or butter which is not kept in a receptacle closely covered. It is difficult to avoid it in any case, so that the nurse is advised to keep melons, cucumbers, etc., out of the ice-box in which the above-mentioned products are placed.

Method of Washing Dishes. — Cleanliness must be observed in the care of all food materials and the utensils in which they are to be prepared. If the nurse will observe the scientific rules governing the solubility of the foodstuffs, she will be able to save herself much time and trouble. For example, it is a known scientific fact that starch is insoluble in cold water and more or less soluble in boiling water, hence it would be a useless waste of time to try to wash a utensil in which a starchy food has been cooked in cold water. Fats solidify under the influence of cold and melt under the influence of heat, so that hot water should be used in conjunction with soap or an alkali to remove grease from dishes and silver and utensils. Albumens are soluble in cold water and are coagulated in hot, therefore to remove milk, egg white, and like protein substances from glasses, spoons, etc., it is advisable to soak first in cold water to wash out the food material, and then to wash thoroughly in hot soapsuds to cleanse and polish. The dishcloths used in the washing and drying of dishes and kitchen utensils should be washed after using in hot soapsuds, rinsed in clear water, then dried in the sun. When this is impossible, they should at least be hung in the fresh air to make them sweet and clean before the next using. In contagious diseases the care of the utensils and dishes used by the patient is of the utmost importance. They should be thoroughly sterilized before being placed with those used by the rest of the family, otherwise the disease may be communicated to the unaffected members. A word about the handling of glasses and spoons used in administering medicine in the sick-room: It is advisable when possible to keep these separate from those used on the tray, as many medicines have a very lasting and disagreeable taste, which is more than apt to cling to the spoons or glasses in which they are measured and in turn be communicated to the food, making it distinctly unpalatable. This has been found to be the case with asafetida, valerian, ichthyol, etc.

Contamination of Food. — Food should always be protected from dirt and dust and from contamination and pollution from flies and other insects. Typhoid fever and certain intestinal disturb-

ances have been known to result from flies coming in contact with raw food — milk, for example. Poisoning due to polluted water used to freshen vegetables has already been spoken of. All of these types of poisoning may be avoided by using care in the handling of the fresh foods. **Ptomaines**, however, are not easy to prevent. Their source cannot always be traced to one particular article of diet. They may be present in cooked, raw, frozen, or canned foods. At times the evidence of extreme decomposition will be found in the foods themselves, while at other times there will be no such evidence in the food, but the result of the ptomaine will be perfectly evident whenever certain individuals partake of that food. This is a personal idiosyncrasy which it is impossible to account for.

Food Poisoning. — Poison caused by decomposed eggs has manifested itself in individuals who have partaken of cake in which such eggs were used. Canned meat and fish have produced the most violent types of ptomaine poisoning. As a rule in these cases the canned article has begun to decompose and while the decomposition may not have advanced sufficiently far to be discernible from the flavor or odor, it is there, and if the resistance of the individual eating this food is not great serious danger may result. Poisoning develops in some individuals upon the eating of shellfish, strawberries, oranges, pimentos, and various other foods, — another evidence of personal idiosyncrasy against certain articles of diet. There is no way to overcome these idiosyncrasies; the only thing to do is to warn the individuals so affected to let the offending foods alone.

ADULTERATION OF FOOD

The adulteration of food, which formerly was practiced by unscrupulous dealers to cover up inferior articles, or by manufacturers to prevent or arrest decomposition in canned goods, is regulated by law. The passage of the National Pure Food and Drug Act gave the Government authority to regulate the preservatives and coloring matter used in canned and bottled goods, forcing the manufacturers to state on the label the exact contents of each

bottle or can. There are likewise stringent laws governing the adulteration of milk, butter, and other articles of food.

Tests for Adulterants. — Boric acid, borax, and formaldehyde are the preservatives more often found in milk. These chemicals are introduced to arrest the natural souring and decomposition which takes place after milk reaches a certain age. Occasionally salicylic acid and sodium carbonate are used. Formaldehyde may be detected by placing about 20 c.c. of milk in a small glass vessel or tube. Dilute with an equal amount of pure water, add commercial sulphuric acid, allowing it to flow gently down the inside of the tube. A purple ring will appear at the zone of contact if formaldehyde is present. "Boric acid and borax may be detected by adding a drop or two of hydrochloric acid to a few drops of milk in a white dish and then several drops of a saturated alcoholic solution of *turmeric*. The dish is then heated gently for a few minutes, and, if boric acid or borax is present, a pink or dark red color will appear. A dark blue-green should appear when the dish is cooled and a drop of ammonia added." [1]

Canned goods must be carefully examined before being used. The domestic canned goods are rarely adulterated, but imperfect sterilization and defective cans may bring about a condition of fermentation and gas formation due to bacterial action. Cans should have a concave appearance on the top. If there is a bulging of the can it may be due to gas formation, and a small hole should be made in the can to note any escape of this gas. Should there be any indication of fermentation, the contents should be discarded. It is advisable to look with suspicion on cans that appear old, rusty, and soiled; they are probably left-over stock and liable to be bad. Peas which have been imperfectly sterilized produce a type of gas which is soluble in the liquid. After decomposition has occurred there will be no apparent evidence by the escape of gas, but the liquid will be found to be excessively acid, and will present a muddy appearance. Certain foreign importations of canned goods are preserved in color by the introduction of certain color preservatives. Peas — petits pois,

[1] "Diseases of Nutrition and Infant Feeding," by Morse and Talbot.

for example — and the very small string beans which are imported are intensely green from the copper sulphate used. Its presence may be detected by adding a few drops of hydrochloric acid to some of the colored material, then dropping in a bright steel nail, knitting needle, or knife blade. There will be a deposit of copper salts (like copper plating) upon the steel if the preservative is present in the can. Canned corn is often artificially sweetened with saccharine, which may be detected by shaking several tablespoonfuls of the liquid in an equal amount of chloroform. Saccharine is soluble in chloroform, while sugar is not. Allow the mixture to stand a few minutes and remove some of the chloroform which has settled at the bottom. Place in a small dish, evaporate the chloroform by gently heating the dish; taste the residue; if sweet, saccharine is present.

Coffee is adulterated more often when it is put up in ground or powdered form than when sold in the bean. Real coffee contains a small percentage of oil, and will float when thrown into a glass of water. Substitutes generally sink to the bottom. Coffee substitutes are often made up of starch-containing materials, such as cereals, beans, and peas. This starch may be detected by mixing one tablespoonful of the suspected coffee in a little cold water, adding one cup of boiling water; allow it to boil two minutes, filter through cotton, and pass the liquid through charcoal to remove the color. When it is cold, add a few drops of dilute iodine solution. If starch is present, a blue color will appear.

METHODS USED IN THE PREPARATION OF FOOD

Food is prepared for consumption by a number of methods and the method by which the food is prepared either increases or decreases its digestibility, palatability, and general usefulness.

Certain foods, as has already been stated, require a high degree of temperature to make them wholesome, but if this temperature is applied by means of heated fat, as in frying, the food is changed from a wholesome to a more or less indigestible article. In health the organs of digestion are capable of overcoming much of the harm wrought by wrong preparation, but even in the healthy, normal

individual a steady diet of fried food will eventually undermine what is known as good digestion. In abnormal conditions (illness) frying is a method seldom, if ever, used.

Preparation of Food. — The various methods to which food is subjected in preparation for human consumption may be summed up as follows: boiling, simmering, steaming, baking, roasting, broiling, frying, sautéing.

Boiling is cooking in water raised to the boiling point, 212° F. (sterilizing). This method is commonly used in the cooking of starchy vegetables and cereals, and in the cooking of green vegetables, such as spinach, carrots, beets, corn, asparagus, etc. Stewing is a form of boiling. As a rule water is used, and the vessel is left uncovered, so that as the food is cooked the surplus moisture evaporates, leaving the food tender. Dried fruits, such as prunes and apricots, are prepared by this method.

Simmering is cooking in water, the temperature of which is not raised to the boiling point, but kept between 200° F. and 210° F. This method is used in the preparation of eggs and dishes in which eggs predominate, since proteins are made tough if subjected to a high degree of temperature. Coddled eggs, for example, are prepared by placing the egg in a clean vessel and pouring over it the boiling water, then covering the vessel and allowing it to stand for ten or fifteen minutes. The vessel and the cold egg reduce the temperature of the water to about 185° or 190° F. and in this way prevent a toughening of the albumen of which eggs are chiefly composed. Soups, broths, ragouts, etc., are prepared by this method.

Steaming is cooking over hot water or by steam. This method may be accomplished on the top of the stove in a " double boiler " or in the oven in a deep covered pan fitted with a " rack " to hold the article to be cooked. Either method allows the vessel in which the food is placed to be surrounded by boiling water, but does not insure sufficient heat to raise the food within to the boiling point.

Baking and **roasting** are both brought about in the oven. Bread, biscuits, pies and other pastry, potatoes, cakes, etc., are baked,

while meats, roast of beef, lamb, veal, mutton, as well as chicken, turkey, duck, and large fish are roasted. The heat in the oven may be intense. The outside or cut surface of the meat is seared, the soluble albumens are coagulated, thus sealing the juices within. If the meat is placed in a pan surrounded by cold water and then placed in the oven, the juices are "drawn out" in the water. These juices contain the flavoring matter or extractives. Meat so treated is not so palatable or highly flavored as that which has first been subjected to intense heat, the water for the gravy added later.

Frying and **sautéing** is cooking in hot fat. Food may be fried in deep fat, as is demonstrated in the cooking of croquettes, doughnuts, etc., or it may be sautéd in butter or oil in a shallow frying pan or griddle. The latter method is used in making hashed brown potatoes, for example; also in the frying of griddle cakes, etc.

Broiling. — In broiling or grilling the article to be cooked is exposed to direct heat, either to the blaze or to a very hot surface. The result is the same as in roasting. The outer surface is seared, sealing the juices within. Meat to be broiled is generally cut thinner than that to be roasted. The article, whether it is meat (steak), chops, birds, or chicken, is placed about three inches away from the flames and turned frequently until the surfaces are seared, after which the article is placed in a cooler part of the stove to allow the interior to be cooked. Pan broiling is done on top of the stove. The article to be broiled is placed directly upon a very hot surface, there is no grease used and the meat must be turned frequently to prevent burning.

Poaching. — This term is applied chiefly to the cooking of eggs in a shallow pan of water heated just below the boiling point. To be properly poached an egg must be perfectly fresh, or the white and yolks will run together and present an unappetizing, unpalatable appearance.

The following time-table should be used in the preparation of food to insure correct cooking:

TIME-TABLE

Material	*Method*	*Time*
Beef (fresh)	Boiled	4 to 6 hours
Corned beef	Boiled	4 to 7 hours
Shoulder or leg of mutton	Boiled	3 to 5 hours
Shoulder or leg of lamb	Boiled	2 to 3 hours
Fowl (4 to 5 pounds)	Boiled	2 to 4 hours
Chicken (3 lb. hen)	Boiled	1 to 1½ hours
Ham	Boiled	4 to 6 hours
Lobster	Boiled	25 to 30 minutes
Salmon (whole)	Boiled	10 to 15 minutes
Vegetables:		
Asparagus	Boiled	25 to 30 minutes
String beans	Boiled	1 to 2 hours
Dried beans	Boiled	1 to 2 hours
Beets (new)	Boiled	45 minutes to 1 hour
Beets (old)	Boiled	4 to 6 hours
Beet greens	Boiled	1 hour or more
Brussels sprouts	Boiled	15 to 20 minutes
Cabbage (for creamed cabbage)	Boiled	10 to 15 minutes
Cabbage	Boiled	30 to 80 minutes
Cauliflower	Boiled	1 to 1½ hours
Celery	Boiled	2 to 2½ hours
Corn (green)	Boiled	10 to 20 minutes
Onions	Boiled	45 minutes to 2 hours
Oyster plant (salsify)	Boiled	45 minutes to 1 hour
Parsnips	Boiled	30 to 45 minutes
Peas	Boiled	20 to 60 minutes
Carrots	Boiled	20 to 40 minutes
Potatoes (white)	Boiled	20 to 35 minutes
Potatoes (sweet)	Boiled	20 to 30 minutes
Rice	Boiled	20 to 30 minutes
Squash	Boiled	20 to 30 minutes
Spinach	Boiled	15 to 20 minutes
Tomatoes (stewed)	Boiled	20 to 30 minutes
Turnips	Boiled	45 to 60 minutes
Coffee	Boiled	3 to 5 minutes
Beef (ribs or loin, rare) per pound	Roasted	8 to 10 minutes
Beef (ribs or loin, well done) per pound	Roasted	12 to 15 minutes
Beef (rolled, rare) per pound	Roasted	12 to 15 minutes
Beef (rolled, well done) per pound	Roasted	15 to 20 minutes
Leg of lamb per pound	Roasted	10 minutes
Leg of mutton, per pound	Roasted	15 minutes
Mutton (stuffed, forequarter) per pound	Roasted	15 to 20 minutes
Lamb, well done, per pound	Roasted	15 to 18 minutes
Veal, well done, per pound	Roasted	20 to 25 minutes

TIME-TABLE — *Continued*

Material	*Method*	*Time*
Pork, well done, per pound	Roasted	20 minutes
Chicken, well done, per pound	Roasted	15 to 20 minutes
Turkey (8 to 10 pounds)	Roasted	3 hours
Ducks (domestic)	Roasted	1 to 1½ hours
Ducks (wild)	Roasted	20 to 30 minutes
Small birds	Roasted	15 to 30 minutes
Large fish	Roasted	45 minutes to 1 hour
Fish steaks, stuffed	Roasted	45 minutes to 1 hour
Steak, 1 inch thick	Broiled	6 to 12 minutes
Steak, 1½ inches to 2 inches thick	Broiled	15 to 20 minutes
Lamb chop or mutton chop	Broiled	10 to 15 minutes
Quail	Broiled	12 to 20 minutes
Squab	Broiled	12 to 20 minutes
Spring chicken (broiler)	Broiled	20 to 40 minutes
Shad	Broiled	12 to 15 minutes
Bluefish	Broiled	12 to 15 minutes
Bread (loaf)	Baked	45 minutes to 1 hour
Rolls (risen)	Baked	20 to 25 minutes
Biscuits	Baked	10 to 12 minutes
Muffins	Baked	20 to 25 minutes
Sponge cake (loaf)	Baked	45 to 60 minutes
Layer cake	Baked	20 to 25 minutes
Cookies	Baked	10 to 15 minutes
Custards	Baked	20 to 60 minutes
Steamed brown bread	Steamed	2 to 3 hours
Pastry	Baked	30 to 45 minutes
Potatoes	Baked	30 minutes to 1 hour
Scalloped dishes	Baked	20 minutes
Steamed puddings	Baked	1 to 4 hours
Plum pudding	Baked	2 hours (after steaming 10 hours)

CARE OF ICE-BOX AND CONTENTS

The ice-box plays an important rôle in the preservation of the health and comfort of the family, as well as that of the invalid. Therefore the first consideration is the cleanliness of it. The old-fashioned boxes were constructed without ventilation. This was clearly a mistake, since many foods absorb both the odor and flavor of the substances about them if allowed to stand for any great length of time in a closed compartment with them. The ice-boxes or refrigerators of to-day have a ventilation system which

insures a circulation of air constantly throughout the interior of the box. The drain pipes require special attention, because no matter how clean the box itself is kept, the melting of the ice causes a slime to accumulate on the inside of the pipe which will clog it and become offensive unless it is flushed out often. This may be accomplished by pouring through it a solution made by dissolving one-half ounce of borax, washing soda, or ammonia in one gallon of boiling water. The adjustable part of the pipe can be removed and cleaned with a long brush made for the purpose. The pipe is then replaced and the boiling water poured through. In this way the entire drainage system of the box is completely cleaned. All loose bits of food which may drop from the containers to the floor and shelves should be carefully removed each day and the interior of the box and shelves thoroughly wiped out. Three times a week is sufficient to wash and flush the box and pipes unless milk, cream, or other food materials have been spilled, in which case it should be washed at once before it has an opportunity to sour or spoil and become offensive. Ice should always be washed off before being put in the box, and all milk and cream bottles should likewise be wiped with a clean wet cloth before being placed on the ice.

Hot food must never be put in the ice-box, as the heat from the food will raise the temperature of the air in it. In some cases the sudden chilling of the food itself is undesirable, but this is not so often the case. However, the best results are obtained by first allowing the food to cool, and then placing it on ice. This is particularly the case with jellies made from gelatine.

SUMMARY

To summarize the points affecting care and preparation of the foods constituting any dietary, we may say that cleanliness is the keynote of the situation. No food is wholesome unless it is clean; no dietary is permissible if prepared without due regard to this principle.

Substitution in Cooking. — Substitution is another point requiring knowledge and attention, and the nurse who is able to

successfully substitute a food of equal value and similar composition for one which will distress or is disliked by the patient, or one which is unobtainable, has gone far toward attaining efficiency in the practical use of dietetics.

Formulation of Diets. — A word as to the formulation of diets: Let it be understood that the diet plays just as important a part in the treatment of many pathological conditions as the medicinal treatment. In many cases it is the chief point upon which the life of the patient depends. Let it be understood, then, that all dietaries should be ordered by the physician, and no nurse should undertake to formulate a dietary for the patient unless permitted to do so by the physician in charge, or unless there is no physician to do it for her.

THE TRAY

As the patient's tray assumes an important part of the daily régime, it is necessary to give close attention to the arrangement and serving of it. There are certain definite rules to observe: (1) The linen, silver, glassware, china, and food must be absolutely clean. (2) The tray must be sufficiently large not to appear crowded. (3) The arrangement of the obligatory articles, such as salt and pepper, silver, water glass, napkin, etc., must be alike at every meal; this not only facilitates the service by making it easy for the nurse to see whether any of these necessary articles are left off, but it also enables the patient to find them without trouble.

The Linen. — The linen cover of the tray must be clean and uncreased. The napkin likewise must be clean and unwrinkled. The china must be free from chips and cracks. Care must be taken not to put a collection of odd pieces on the tray as it gives an untidy appearance.

The Silver. — The silver must be bright and in cold weather made slightly warm, as must also the china. The chill of cold silver may readily obliterate a fragile appetite, and to place hot food in cold dishes will deprive it of much of its palatability. The foods intended to be hot must be really hot, not warm, and those

which are intended to be cold should be thoroughly chilled before being served to a patient. The placing of flowers on a tray is a questionable addition to it; a single flower laid across the folded napkin may add daintiness and attractiveness, but it is poor judgment to over-decorate, either with flowers or by garnishing the dishes.

Arranging the Tray. — If the nurse will place the necessary articles upon the tray and memorize their position so that she will be able to duplicate the same at each meal, she will be able to tell at a glance if everything needed is in its proper place, thereby saving herself unnecessary steps and the patient the worry of having to wait until they can be brought. Food should not be allowed to stand in the sick-room, and glasses or plates in which food has been served should be removed from sight as soon as the patient finishes with them. Care must be taken, however, not to create the impression of hurry or the patient will be made nervous and either will lose her appetite or have indigestion.

The nurse should be careful of her topics of conversation during the meal hour. Especially must disagreeable subjects and business matters be rigidly excluded if the invalid is to obtain the full benefit of the food served her.

In the cases requiring special diets, the nurse should make out the "diet sheet" for the day. In hospitals this is passed to the dietitian, who carries out the directions laid down by the physician. The nurse, however, should carefully check the tray before serving it, since mistakes sometimes occur, and to give the wrong food to a patient suffering from certain disorders may give rise to serious trouble, causing pain and discomfort and at times death.

CHAPTER III

THE FUEL VALUE OF FOOD

SCIENCE has proved that the human body is composed of certain chemical elements and that food materials are combinations of like elements; it has likewise proved that the body will utilize her own structure for fuel to carry on the work of her various functions unless material is supplied for this purpose from an outside source, namely, food, which in chemical composition so closely resembles that of the human body.

Amount and Type of Food. — The next point of investigation would logically be the amount and kind of food necessary to best accomplish this purpose. To be able to do this it was necessary to have some standard unit by which to measure the amount of heat each food was capable of producing when burned outside the body, after which it was more or less simple to calculate the heat production of each of the food combinations within the organism. An apparatus known as the "Bomb Calorimeter"[1] was devised by Berthelot, and adapted for the examination of food materials by Atwater and Blakesley. The food material to be tested was placed within the bomb, which was charged with a known amount of pure oxygen. The bomb was then sealed and immersed in a weighed amount of pure water, into which a very delicate thermometer was inserted. The food within the bomb was ignited by means of an electric fuse, and the heat given off by the burning of the material was communicated to the surrounding water and was registered upon the thermometer. It was evident that some definite name had to be devised by which these heat units might be known. Hence the name "**calorie**," which represents *the amount of heat required to raise the temperature of 1*

[1] For full description and methods used, see "Journal of The American Chemical Society," July, 1903.

kilogram of pure water 1 degree centigrade, or about 4 pounds of water 2 degrees Fahrenheit.

Transformation of Foods into Available Fuel. — A comparison has been made between the human body and a steam engine, but this comparison is not adequate, since the food does not produce heat within the body originally, but energy of which heat is a by-product. Each food combination has a certain amount of dormant energy within its structure and this energy does not become active nor can it be utilized by the body until the food, of which it is a part, is changed within the organism to substances more nearly like its own. This liberated active energy is then used as a motive power to carry on the internal and external work of the body, and the heat, which is invariably the consequence of any active energy (motion), leaves the body as such. It will be seen, then, that the human body acts not as a steam engine, but rather as a **transforming machine** by means of which the dormant energy of the food is transformed into an active agent of which heat is a natural result.

In the calorimeter it was found that the carbohydrates and fats burned to the same end products, namely, carbon dioxide and water, while the proteins, upon oxidation, produced carbon dioxide, water, and nitrogen gas. In the body it was found that the carbohydrates and the fats acted in exactly the same manner as in the calorimeter, producing the same end products. But this was not the case with the proteins; the oxidation process of this chemical combination was found to be not nearly so complete within the body as in the calorimeter, and instead of the free oxygen as produced in the apparatus there was urea and other nitrogenous substances eliminated which, while combustible, represented a less complete oxidation of the proteins.

The following table shows the average heats of combustion:

TABLE[1] VII

Carbohydrates	4.1 cal. per gram
Fats	9.45 cal. per gram
Protein (nitrogen × 6.25)	5.95 cal. per gram

[1] "Chemistry of Food and Nutrition," by Henry Sherman.

The loss of potential energy due to the incomplete oxidation of the proteins in the body is approximately 1.2 calories to each gram of protein in food, and in calculating the fuel value of any food in the body due allowance must be made for the losses in digestion. It has been found advisable to calculate these losses in a general way, using a mixed diet as a basis upon which they are formed. The following table shows an approximate average of these losses due to incomplete digestion:[3]

TABLE VIII

	Lost	*Absorbed*
Carbohydrates	2 per cent	98 per cent
Fats	5 per cent	95 per cent
Proteins	8 per cent	92 per cent

Rubner's calculations on the fuel value of foods are slightly higher than the ones upon which the diets in this book are based. This is due to the fact that he made his experiments upon dogs instead of the human being, and the averages due to losses in digestion are not so great, as the table will show:

RUBNER'S TABLE[3] IX

Carbohydrates	4.1 calories per gram
Fats	9.3 calories per gram
Proteins	4.1 calories per gram

Table of approximate physiological fuel value of the food constituents:[3]

TABLE X[3]

Carbohydrates	$4.1 \times 98\% = 4$ cal. per gram
Fats	$9.45 \times 95\% = 9$ cal. per gram
Proteins	$4.35 \times 92\% = 4$ cal. per gram

EFFECT OF HEAT AND COLD UPON THE FOODSTUFFS

In primeval days, when man led a more natural life, his very existence depended upon his ability to wrest from the earth his

[3] "Chemistry of Food and Nutrition," by Sherman.

means of livelihood. As physical strength was the first item of importance, he took by force what he needed to make him strong, and the efforts thus made added strength and endurance to his physical being.

Factors Affecting the Preparation of Food. — This necessary fight for life made it impossible, even had he known or desired to have things otherwise, for him to waste time upon additional preparation of the food; he took it as it came in its raw state and thrived upon it. To-day, however, everything has changed — instead of living and working out of doors and deriving the benefits nature places before us, we are crowded into small spaces, lacking both air and sunshine; we work less with our hands and more with our brains; we put a strain upon the nervous system, which in turn requires additional care on the part of the individual to prevent a general disintegration of the organism. Altogether it is a question of how to increase the output of energy without a complete demolition of the human machine, and this we must do by giving careful attention to the materials used for the purpose of building and repairing the body and that utilized by the body as fuel, so that a maximum value may be obtained with a minimum amount of effort on the part of the organism.

It has been proved that the body does not use the materials in the form in which they are eaten; their nature is too complex for it to handle. Therefore the food passes through a series of changes, chemical in character, made ready to replace the material which has been used in carrying on the internal and external work of the body.

Effect of Cooking upon Food. — It has been proved that the diet of man can be made more effective for his needs if the raw materials are prepared before they are eaten. This preparation of food is known as cooking. Food is cooked, then, for certain definite reasons, namely: (1) to increase its digestibility; (2) to destroy the parasites and harmful bacteria which may infect it; and (3) to stimulate the appetite by developing its flavor and appearance. It will be seen at a glance that a knowledge of the effect of heat, and to a less extent cold, upon the foodstuffs is

not only important but very essential, since it comes within the province of the nurse to protect her patient from all harmful influences which may jeopardize his recovery.

Effect of Cold upon Food. — The effect of cold upon the various foodstuffs has not been so thoroughly investigated as the effect of heat. Little is actually known of the chemical changes which are directly due to the influence of a lowered temperature upon food materials. Certain investigators have been working upon milk, and have proved that some of the bacteria infecting milk may disappear while it is frozen, while others increase rapidly, especially in raw milk. These investigations have only been made with milk frozen for several days. There is no information on the chemical changes taking place in milk frozen only twenty-four hours. Rosenau [4] states that he found that freezing milk for forty-eight hours did not prevent the growth of typhoid bacilli, but did destroy the lactic acid bacilli.

Without a doubt the application of cold to certain foods has its advantages in certain conditions. Many beverages valuable as nutrients are made unpalatable if served warm, whereas they not only serve as foods but allay thirst and in some cases relieve nausea when they are chilled to the desired temperature. Possibly the partaking of large quantities of excessively cold food will influence the rate of digestion in the stomach, since the food mass must be of the temperature of the blood before digestion begins. However, since there is a large amount of blood constantly circulating around the stomach, especially during the period of digestion, it is a question as to whether a reasonable amount of iced food would make a great deal of difference. It would be unwise to risk feeding large quantities of very cold food or very hot food to individuals who are abnormal in health, as serious conditions have been observed to result from an injudicious use of both.

Effect of Heat upon Starch. — Dry Heat: The effect of dry heat upon starch is to convert it into dextrin. A temperature ranging from 300° F. to 400° F., applied to a starchy food, brings about this chemical change in less time than is accomplished by applying

[4] Rosenau: Hygienic Laboratory, Bulletin No. 6, Washington, 1909.

a lesser degree, 212° F., for example. The best example of this change from starch to dextrin is seen in some of the proprietary infant foods. It is also seen in well-made toast; when that article of food is browned thoroughly the change has gone further; when it is burned the starch has been carbonized.

Starch is changed from an insoluble substance to a more soluble one in the presence of moisture and a temperature of 212° F. A long-continued boiling dextrinizes the starch, making it more readily handled by the digestive apparatus. The cooking of vegetables and fruit containing sugar and other carbohydrates tends to increase their digestibility, inasmuch as some of the chemical changes necessary for a complete utilization by the body are started on the outside before the food reaches the digestive apparatus, thus eliminating some of the work of the organism which is obligatory under other conditions.

Heat likewise acts mechanically upon starchy vegetables in the presence of moisture. The foods containing starch also contain another form of carbohydrate not so easily handled by the body in digestion. This carbohydrate, known as cellulose, is woody and fibrous in nature and forms the skeleton of plants, inclosing the starch grains between its tenacious walls. This material delays the digestion of the starch unless it is softened and in a measure broken down before it is allowed to come in contact with the enzymes of the digestive juices. Thus the cooking of foods high in cellulose is the best means of hastening and promoting their utilization in the body.

The Effect of Heat upon Fats. — As fats are more digestible cold than hot, the cooking of food in fat is not desirable from a health standpoint. Fat is readily decomposed under the action of heat, splitting to fatty acids and glycerine. Since fatty acids are irritating in character it is not wise to bring about the change outside the body where there are no secretions to counteract their irritating effect upon the mucous lining of the stomach. When foods are fried, the fats surround the other food materials, forming a coating which causes them to require a much longer time for leaving the stomach than they would require if they were not so

treated. According to Cannon, fats leave the stomach more slowly than either of the other two foodstuffs, and when the carbohydrates or proteins are mixed with fat the delay in their passage from the stomach is greater than if either were fed alone. Consequently, it is clearly demonstrated that in frying a food (subjecting it to heat in the presence of fat) one is courting disaster from the point of digestion.

The Effect of Heat upon Protein. — There are a number of protein foods, as has already been stated, and the care with which these foods are prepared either increases or decreases their usefulness in nutrition. Albumens are soluble proteins, readily affected by a rise of temperature and decreasing in digestibility in proportion to the elevation of temperature. Coagulation begins in the soluble albumens at about 135° F. This coagulation continues, changing the character of the substance from a soluble to an insoluble one as the temperature rises. If the albumen is kept at a temperature of 212° F. for a long period, it will assume a tough, fibrous texture, difficult of digestion unless it is ground very finely and masticated thoroughly. The best example of this point may be had in the cooking of eggs. The white of eggs is composed chiefly of soluble albumen. If the egg is placed in water and the temperature gradually elevated, a change is brought about; the character of the albumen changes from a sticky viscid mass, first to a jelly-like consistency, somewhat opalescent in looks and very easy of digestion, then to one more firm and more opaque but still easily handled by the digestive juices. When the temperature is kept at the boiling point for any length of time the egg white becomes tough. This toughness increases until a rubber-like substance is formed which is more or less difficult of digestion.

The raw surfaces of meat — that is, meat which has been cut in cross sections — have a certain amount of soluble albumen brought to the surface on account of having the membranes which inclose the sheaths of muscle and the blood cells severed. This soluble albumen is very susceptible to coagulation. On being brought into contact with a hot surface, as in broiling or roasting, this albumen coagulates and forms an effectual coating to the

inner protein, thus preventing an excess of heat reaching it and making it more digestible. This mode of cooking also prevents the escape of the soluble extractives, thus making the meat more savory to the taste.

SUMMARY

In summing up the effect of heat upon foodstuffs as practiced in cooking, it is seen that while it undoubtedly increases the digestibility, hence the usefulness, of some food materials, it also decreases it in others. It is important, then, for the nurse to understand which foodstuff predominates in the material she is intending to use in the diet of her patient, that she may formulate and prepare that diet intelligently, and this is best done by a careful study of the foodstuffs themselves as seen in the following table: [5]

TABLE XI

CHEMICAL COMPOSITION OF COMMON FOODS

Food Materials [6]	*Water* Per cent	*Protein* [7] *N* × 6.25 Per cent	*Fats* Per cent	*Carbohydrates* Per cent	*Ash* Per cent
Animal Food					
Bacon, smoked, E. P. . . .	20.2	9.9	64.8		5.1
Beef free from visible fat, E.P.	73.8	22.1	2.9		1.2
Beef, round steak, lean, E. P.	70.0	21.0	7.9		1.1
Beef, sirloin steak, E. P. . .	61.9	18.9	18.5		1.0
Beef, porterhouse steak, E. P.	52.4	19.1	17.9		0.9
Beef, tenderloin, E. P. . . .	59.2	16.2	24.2		0.8
Beef, roast, cooked	48.2	22.3	28.6		1.3
Tenderloin steak broiled, E. P.	54.8	23.5	20.4		1.2
Sweetbreads, A. P.	70.9	16.8	12.1		1.6
Brains, E. P.	80.6	8.8	9.3		1.1
Veal, breast	62.2	20.3	11.0		1.0

[5] Table shows the distribution of the various foodstuffs as they occur in the common food materials, compiled from Bul. 28, U. S. Department of Agriculture, by Atwater and Bryant.

[6] Table compiled from Bulletin 28, Office of Experiment Stations, U. S. Dept. Agriculture. Fuel values calculated from above percentage using factors: Protein 4 calories; Fat 9 calories; Carbohydrates 4 calories.

[7] Using the nitrogen factor 6.25, that is, for every gram of nitrogen there are 6.25 grams of protein; for example, to 10 grams of nitrogen there will be 6.25 × 10 = 62.5 grams protein.

TABLE XI—*Continued*

Food Materials	*Water* Per cent	*Protein* $N \times 6.25$ Per cent	*Fats* Per cent	*Carbohydrates* Per cent	*Ash* Per cent
Animal Food					
Veal cutlets	70.7	20.3	7.7		1.1
Veal kidneys	75.8	16.9	6.4		1.3
Lamb chops broiled	47.6	21.7	29.9		1.3
Roast	67.1	19.7	12.7		.8
Mutton leg, E. P.	19.8	12.4			
Roast, cooked	50.9	25.0	22.6		1.2
Pork, ham	40.3	16.3	38.8		4.8
Ham, boiled, E. P.	51.3	20.2	22.4		6.1
Chicken, broilers, E. P.	74.8	21.5	2.5		1.1
Chicken, fowl, E. P.	63.7	19.3	16.3		1.0
Turkey, E. P.	55.5	21.1	22.9		1.0
Turkey, roasted, E. P.	52.0	27.8	18.4		1.2
Fish					
Bass, black, E. P.	74.4	19.4	4.9		1.5
Bluefish, dressed, E. P.	78.5	19.4	1.2		1.3
Butterfish, dressed, E. P.	70.0	18.0	11.0		1.2
Cod, dressed, E. P.	81.8	15.6	.1		.8
Haddock, dressed, E. P.	81.7	17.2	.3		1.2
Halibut, dressed, E. P.	75.4	18.6	5.2		1.0
Herring, dressed, E. P.	72.5	19.5	7.1		1.5
Mackerel, dressed, E. P.	74.9	19.5	4.6		1.2
Salmon, dressed, E. P.	63.6	17.8	17.8		1.1
Shad, dressed, E. P.	70.6	18.8	9.5		
Shad roe	71.2	20.9	3.8	2.6	1.5
Shellfish					
Clams, E. P.	86.2	6.5	.4	4.2	2.7
Crabs, hard shell, E. P.	77.1	16.6	2.0	1.2	3.1
Lobster, E. P.	79.2	16.4	1.8	.4	2.2
Oysters in shell, E. P.	86.9	6.2	1.2	3.7	2.0
Oysters, solids, E. P.	88.3	6.0	1.3	3.3	1.1
Scallops, E. P.	80.3	14.8	.1	3.4	1.4
Shrimps, canned, E. P.	70.8	25.4	1.0	0.2	2.6
Eggs, uncooked, E. P.	73.7	13.4	10.5		1.0
Eggs, boiled, E. P.	73.2	13.2	12.0		0.8
Egg whites, cooked	86.2	12.3	0.2		0.6
Egg yolks, cooked	49.5	15.7	33.3		1.1
Milk and Milk Products					
Whole milk	87.0	3.3	4.0	5.0	0.7
Skimmed milk	90.5	3.4	0.3	0.5	0.7
Whey	93.0	1.0	0.3	5.0	0.7
Buttermilk	91.0	3.0	0.5	4.8	0.7

TABLE XI — *Continued*

Food Materials	*Water* Per cent	*Protein* N×6.25 Per cent	*Fats* Per cent	*Carbohydrates* Per cent	*Ash* Per cent
Milk and Milk Products					
Koumiss	89.3	2.8	2.1	5.4	.4
Condensed milk unsweetened, A. P.	68.2	9.6	9.3	11.2	1.7
Condensed milk sweetened, A. P.	26.9	8.8	8.3	54.1	1.9
Butter	11.0	1.0	85.0		3.0
Cheese, cottage	72.0	20.9	1.0	4.3	1.8
Cheese, American, pale	31.6	28.8	35.9	.3	3.4
Cream cheese, full cream	34.8	25.9	33.7	2.4	3.8
Vegetable Foods — Flour and Meals					
Barley	11.9	10.5	2.2	72.8	2.6
Barley, pearled	11.5	8.5	1.1	77.8	1.1
Buckwheat flour	13.6	6.4	1.2	77.9	.9
Corn meal, unbolted	11.6	8.4	4.7	74.0	1.3
Corn meal, granular	12.5	9.2	1.9	75.4	1.0
Corn preparations: Cereals	10.3	9.6	1.1	78.3	.7
Hominy, uncooked	11.8	8.3	.6	79.0	.3
Hominy, cooked	79.3	2.2	.2	17.8	
Oatmeal, boiled	84.5	2.8	.5	11.5	.7
Oatmeal gruel	91.6	1.2	.4	6.3	.5
Oatmeal water	96.0	.7	.1	2.9	.3
Rolled oats	7.7	16.7	7.3	66.2	2.1
Rice, raw	12.3	8.0	.3	79.0	.4
Rice, boiled	72.5	2.8	.1	24.4	.2
Rye flour	12.9	6.8	.9	78.7	.7
Wheat flour, entire	11.4	13.8	1.9	71.9	1.0
Wheat flour, Graham	11.3	13.3	2.2	71.4	1.8
Wheat flour roller process, baker's grade	11.9	13.3	1.5	72.7	.6
Wheat flour, family grade	11.9	10.9	1.1	75.6	.5
Wheat Preparations and Breads					
Cracked wheat	10.1	11.1	1.7	75.5	1.6
Flaked wheat	8.7	13.4	1.4	74.3	2.2
Farina	10.9	11.0	1.4	76.3	.4
Macaroni	10.3	13.4	.9	74.1	1.3
Macaroni, cooked	78.4	3.0	1.5	15.8	1.3
Spaghetti	10.6	12.1	.4	76.3	.6
Gluten	8.9	13.6	1.7	74.6	1.2
Brown bread	43.6	5.4	1.8	47.1	2.1

TABLE XI — *Continued*

Food Materials	*Water* Per cent	*Protein* $N \times 6.25$ Per cent	*Fats* Per cent	*Carbohydrates* Per cent	*Ash* Per cent
Wheat Preparations and Breads					
Rye bread	50.7	11.9	.6	51.5	.9
Rye and wheat bread	35.3	11.9	.3	53.1	1.0
Wheat bread, white	35.3	9.2	1.3	49.7	1.1
Whole wheat	38.4	9.7	.9	52.1	1.3
Graham bread	35.7	8.9	1.8	49.8	1.5
Gluten bread	38.2	9.3	1.4	55.3	1.3
Biscuit, homemade	32.9	8.7	2.6	60.1	.5
Maryland biscuits	24.6	8.4	5.6	56.7	1.5
Rolls	29.2	8.9	4.1	68.5	1.1
Crackers, saltines	5.5	10.6	12.7	73.8	2.6
Graham crackers	5.4	10.0	9.4	69.0	1.4
Oatmeal crackers	6.3	11.8	11.1	73.7	1.8
Cake, cookies	8.1	7.0	9.7	68.5	1.5
Cup cake	15.6	5.9	9.0	2.2	1.0
Vegetables					
Asparagus, cooked, E. P.	91.6	2.1	3.3	29.1	.8
Beans, butter, E. P.	58.9	9.4	.6	59.6	2.0
Beans, dried	12.6	22.5	1.8	7.4	3.5
Beans, string	89.2	2.3	.3	7.4	.8
Beets, cooked, E. P.	88.6	2.3	.1	5.6	1.6
Cabbage, E. P.	91.5	1.6	.3	9.3	1.0
Carrots, E. P.	88.2	1.1	.4	3.3	.9
Celery, E. P.	94.5	1.1	.1	19.7	1.0
Corn, green, E. P.	75.4	3.1	1.1	3.1	.7
Cucumbers, E. P.	95.4	.8	.2	5.1	.5
Eggplant, E. P.	92.9	1.2	.3	6.3	.5
Greens, turnip	86.7	4.2	.6	59.2	2.2
Lentils, dried	8.4	25.7	1.0	2.9	5.7
Lettuce	94.7	1.2	.3	6.8	.9
Mushrooms	88.1	3.5	.4	7.4	1.2
Okra	90.2	1.6	.2	9.9	.6
Onions, fresh	87.6	1.6	.3	4.9	.6
Onions, cooked	91.2	1.2	1.8	13.5	.9
Parsnips	83.0	1.6	.5	16.9	1.4
Peas, green	74.6	7.0	.5	62.0	1.0
Peas, dried	9.5	24.6	1.0	14.6	2.9
Peas, cooked	73.8	6.7	3.4	18.4	1.5
Potatoes, raw	78.3	2.2	0.1	20.9	1.0
Potatoes, cooked	75.5	2.5	.1	27.4	1.0
Potatoes, sweet	69.0	1.8	.7	3.6	1.1
Rhubarb	94.4	.6	.7	35.9	.7

TABLE XI — *Continued*

Food Materials	*Water* Per cent	*Protein* $N \times 6.25$ Per cent	*Fats* Per cent	*Carbohydrates* Per cent	*Ash* Per cent
Vegetables					
Spinach, cooked	89.8	2.1	.3	3.2	2.1
Squash	88.3	1.4	.5	9.0	0.8
Tomatoes, fresh	94.3	.9	.4	3.9	0.5
Tomatoes, canned	94.0	1.2	.2	4.0	0.6
Turnips, fresh	89.6	1.3	.2	8.1	0.8
Fruits					
Apples, E. P.	84.6	.4	.5	14.2	0.3
Apple sauce, A. P.	61.1	.2	.8	37.2	0.7
Apricots	79.9	1.0		12.6	0.5
Bananas	75.3	1.3	.6	22.0	0.8
Blackberries	86.3	1.3	1.0	10.9	0.5
Cranberries	88.9	.4	.6	9.9	
Currants	85.0	1.5		12.8	0.7
Dates (dried)	15.4	2.1	2.8	78.4	1.3
Figs, fresh	79.1	1.5		18.8	0.6
Figs, dried	18.8	4.3	.3	74.2	2.4
Grapes	77.4	1.3	1.6	19.2	0.5
Lemons	89.3	1.0	.5	5.9	0.4
Lemon juice				9.8	
Oranges	86.9	0.8	0.2	11.6	0.5
Peaches	89.4	0.7	0.1	9.4	0.4
Pineapple	89.3	0.4	0.3	9.7	0.3
Plums	78.4	1.0		20.1	0.5
Prunes	22.3	2.1		73.3	2.3
Raisins	14.6	2.6	3.3	76.1	3.4
Strawberries	90.4	0.1	0.6	7.4	1.0
Almonds	4.8	21.0	54.9	17.3	2.0
Chestnuts	45.0	6.2	5.4	42.1	1.3
Peanuts	7.2	25.8	38.6	24.4	2.6
Olive oil			100.0		
Gelatine	13.6	91.4	.1		2.1
Calf's-foot jelly	77.6	4.3		17.4	.7
Candy				96.0	
Honey	18.2	.4		81.2	.2
Molasses	25.1	2.4		69.3	3.2
Marmalade (orange)		.6	.1	84.5	
Arrowroot (starch)	2.3			97.5	.2
Cornstarch				90.0	
Sugar (granulated)				100.0	
Sugar (maple)				82.8	
Sugar (brown)				95.0	
Tapioca	11.4	.4	.1	88.0	

CHAPTER IV

SPECIAL DIETS, METRIC SYSTEM, PERCENTAGE CALCULATION, AND THERMOMETRY

THERE are a number of diets formulated to meet the various normal and abnormal conditions. In hospitals these are classified as follows, for the convenience of both nurse and doctor:

House Diet. — That which is served to the hospital staff, the nurses, and those patients not requiring special diets.

Liquid or Fluid Diet. — Consisting of milk, nutrient and other palatable beverages, broths, and thin gruels.

Light, Semi-solid or Convalescent Diet. — Composed of thick or cream soups, eggs, toast, cereals, custards, jellies and ice cream, and later vegetable purées, broiled birds, chicken, lamb chops, and rare beefsteak.

Mixed Diet. — The diet used in normal conditions and for those not affected by any special food.

Special Diets. — Those designed to be used for certain pathological conditions, such as scarlet fever, nephritis, etc. These diets are classified as follows:

Milk Diet. — A diet in which milk is the sole article of food.

Carbohydrate-free Diet. — One in which the sugars and starches are eliminated.

Purin-free Diet. — One in which the foods rich in purin bases are eliminated. This is used in gout, arteriosclerosis, etc.

Salt-free Diet. — Diet in which sodium chloride (salt) is as far as possible excluded. It is used in certain cases of nephritis when edema is present.

Nephritic Diet. — A diet used in nephritis and diseases complicated by nephritis (scarlet fever). In this diet the protein foods, meat in particular, are restricted, milk being the exception.

Diabetic Diet. — A diet in which the carbohydrates are restricted or eliminated.

"**Allen Treatment of Diabetes**" consists chiefly of "starvation" for a given period and a re-education of the organs to a toleration for carbohydrates.

Emaciation Diets. — Those containing a high percentage of fat-forming foods, such as milk, cream, eggs, cereals, potatoes, etc., olive oil.

Obesity Diets. — Those containing as few of the fat-forming foods as possible, such as cream, olive oil, potatoes, white bread, etc., pastry and desserts, candy and soda water, and containing lean meats, fish or shellfish cooked and served without butter or other fats, fresh or stewed fruit without sugar, green vegetables and salads served without oil or other fats; one egg a day two or three times a week, coffee and tea without sugar or cream, toasted gluten bread (1 slice) without butter, saccharine substituted for sugar.

There are a number of other diets, but they come more or less under the above heads.

METRIC MEASURE

The metric system is a system of weights and measures expressed in the decimal scale. The principal units with which we are concerned are:

The liter — L.	Cubic centimeter — c.c.
The gram — gm.	Centigram — c.
	Milligram — mgm.

These units have prefixes to show how they are divided decimally, *i.e.*:

deci. — 0.1
centi. — 0.01
milli. — 0.001

TABLE XII

UNITS OF WEIGHT

10 milligrams	= 1 centimeter	(cgm.)
10 centimeters	= 1 decigram	(dgm.)
10 decigrams	= 1 gram	(gm.)
10 dekagrams	= 1 hektogram	(hgm.)
10 hektograms	= 1 kilogram	(kilo.)
1000 kilograms	= 1 metric ton	

A cubic centimeter of water weighs 1 gram; 28.35 grams = 1 ounce.

A liter of water weighs 1 kilogram; 1 kilogram of water = 2.2 lb.

Household Weights and Measures

4 saltspoons	= 1 tsp.
3 tsp.	= 1 tbs.
4 tbs.	= ¼ cup or ½ gill
8 tbs.	= ½ cup or 1 gill
16 tbs.	= 1 cup or ½ pint = 8 oz. = 227 gm.
2 cups (c.)	= 1 pint = 454 gm.
2 pints (pt.)	= 1 quart (qt.) = a little less than 1 liter.
4 qt.	= 1 gal.
2 tbs. butter	= 1 ounce (oz.)
2 cups butter (solid)	= 1 pound (16 oz.)
2 cups granulated sugar	= 1 pound

4 qt.	= 1 gal.	
2 cups butter packed solid	= 16 oz.	= 1 lb.
2 cups granulated sugar	= 16 oz.	= 1 lb.
2½ cups powdered sugar	= 16 oz.	= 1 lb.
4 cups flour (sifted)	= 16 oz.	= 1 lb.
1 pt. milk or water	= 16 oz.	= 1 lb.
1 pt. chopped meat	= 16 oz.	= 1 lb.
10 medium size eggs (with shells)	=	1 lb.
8 eggs, without shells	=	1 lb.
2 cups rice	=	1 lb.
2 tbs. butter	= 1 oz.	
4 tbs. butter	= 2 oz.	= ¼ cup
2 tbs. sugar	= 1 oz.	
4 tbs. flour (sifted)	= 1 oz.	
4 tbs. coffee (powdered)	= 1 oz.	
2 tbs. powdered lime	= 1 oz.	
2 tbs. lemon juice	= 1 oz.	
2 tbs. orange juice	= 1 oz.	
1 glass orange juice	= 8 oz.	or ½ pint
2¾ cup oatmeal	=	1 lb.
4¾ cup rolled oats	=	1 lb.

28.35 grams = 2 tablespoons = 1 ounce of the following substances: arrowroot, barley flour, brandy, butter, grape juice, lemon juice, orange juice, molasses, cream, dry peptonoids, liquid peptonoids, milk (whole, skimmed), buttermilk, malted milk, rice flour, oatmeal, olive oil, wine.

Materials requiring 3 tablespoons to weigh 28.35 gm. or 1 oz.: — corn meal, farina, gum gluten flour, graham flour, white flour.

Material requiring 4 tbs. to weigh 1 oz.: cocoa.

The standard measuring cup holds 8 ounces or 16 tablespoonfuls.

1 ordinary glass (water)	= 8 ounces
1 coffee cup	= 8 ounces
1 tea cup	= 6 ounces
1 wine glass	= 2 ounces

The following list shows the approximate weights and measures of the foods comprising dietaries:

Asparagus, 8 stalks, E. P.	= 2 ounces
Apple (1 medium size)	= 5 ounces
Bread, 1 slice, home-made, 4 in. × 3½ in. × ½ in.	= 1 ounce
Bread, 1 slice, baker's, 4 in. × 3½ in. × ¾ in.	= 1 ounce
Bread, 1 slice, whole wheat, 2½ in. × 2¾ in. × ¼ in.	= .7 ounce
Bread, 1 slice, corn, 3 in. × 3 in. × ½ in.	= 2 ounces
Bread, muffin, 1 small, or biscuit	= ½ ounce
Banana, 1 medium size	= 5 ounces
Chicken, 1 serving	= 3 ounces
Chicken (creamed) 2 tbs.	= 1½ ounces
Cream, 2 tbs.	= 1 ounce
Custard (soft ½ cup)	= 4½ ounces
Custard (baked, ½ cup)	= 4 ounces
Cream (ice — ½ cup)	= 4 ounces
Custard (rice ½ cup)	= 3½ ounces
Dates (3 medium size)	= 1 ounce
Eggs (scrambled, ¼ cup)	= 2 ounces
Eggs poached, 1 egg	= 1½ ounces
Fish, medium serving, 2½ in. × 3 in.	= 2½ to 3 ounces
Honey, 4 tsp.	= 1 ounce
Hominy (cooked) ½ cup	= 4 ounces
Lamb chop, E. P., 2 × 2 × ½ inch	= 1.6 ounces
Lemon or other jellies, ½ cup	= 3.8 ounces
Steak (sirloin), 3 × ½ × ¾ in.	= 3 ounces
Vegetables:	
Beets, 1 medium size (4 slices)	= 2 ounces
Carrots, ½ cup diced	= 2½ ounces
Peas (canned or drained) ½ cup	= 3 ounces
Potatoes, baked, sweet, 1 medium size	= 6 ounces
Potatoes, baked, white, 1 medium size	= 3 ounces
Spinach, cooked, 1 serving, ½ cup	= 4 ounces
Tomatoes, 1 medium size — fresh	= 3 to 4 ounces
Soups:	
Cream, ½ cup	= 4 ounces
Clear soup, 1 cup	= 7½ ounces

PERCENTAGE CALCULATION

A percentage of a number is the result obtained by taking the stated number of hundredths of it. The rate per cent is a fraction whose denominator is 100 and whose numerator is the given number of hundredths; thus 6% of a number is $\frac{6}{100}$ of that number.

The method of figuring the per cent of foodstuff in a food material is simple. Milk, for example, has a percentage composition of 3% protein, 4% fat, and 5% sugar. To find the definite amounts of these foodstuffs in 1 ounce of milk it is best to reduce the ounce to grams, since the gram is the unit of measurement generally used.

1 ounce = 28.35 grams
In 1 oz. there will be $28.35 \times .03 = 0.85$ gram protein
In 1 oz. there will be $28.35 \times .04 = 1.13$ grams fat
In 1 oz. there will be $28.35 \times .05 = 1.41$ grams sugar

All other foods are calculated in the same manner.

When not only the percentage of carbohydrate, fats, and proteins in a material is asked for but the fuel value of that food is also demanded, the amount of each chemical combination in the food in grams is multiplied by its fuel factor, which has already been demonstrated in Chapter III. For example, the value of an ounce of milk may be calculated as follows: 3% protein $\times$ 28.35 grams $\times$ fuel factor 4 = $28.35 \times .03$ = .85 gm. protein $\times$ 4 = 3.40 calories
$28.35 \times .04$ = 1.13 gm. fat $\times$ fuel factor 9 = 10.17 calories
$28.35 \times .05$ = 1.41 gm. sugar $\times$ fuel factor 4 = 5.64 calories
Total fuel value 19.21 calories

THERMOMETRY

There are two scales used in thermometry, the Fahrenheit and the Centigrade. The former is generally used. However, since many of the scientific calculations are made using the Centigrade scale it is wise for the nurse to understand how to translate one to the other.

Centigrade has 0° as the freezing point and 100° as the boiling point, while Fahrenheit has 32° as freezing point and 212° as boiling point. To change Fahrenheit to Centigrade it is necessary to subtract 32 from 212 in order to make the freezing points correspond. This would read 212 − 32 = 180° F. = 100° C.; hence a degree Centigrade represents $\frac{5}{9}$ of a degree Fahrenheit.

To change Centigrade to Fahrenheit it is necessary to remember that every Fahrenheit degree is $\frac{9}{5}$ times as large as the Centigrade and the addition of 32° must also be made. For example: Change 105° F. to Centigrade: $105° - 32° \times \frac{5}{9} = 41°$ C. Change 50° C. to Fahrenheit: $50° \times \frac{9}{5} + 32° = 90° + 32° = 122°$ F.

CHAPTER V

FORMULAS FOR THE PREPARATION OF FOOD FOR THE SICK

Beverages

Peptonized Milk

1 pt. of milk 1 tube of (Fairchild's) peptonizing powder

Dissolve the powder in 1 gill of cold water, and place in a clean quart jar (glass).

Pour in 1 pint of cold milk and stop the bottle with cotton, shake well and place the bottle in a saucepan containing water just warm enough to allow of the hand being immersed without being burned (115° F.).

Keep the water at this temperature for 5 to 10 minutes or longer according to the degree of peptonization desired. Lift out of the warm water and plunge into cold, then place at once on ice.

The milk may be poured from bottle into a clean saucepan and brought quickly to a boil to prevent further peptonization; this process, however, is apt to make the milk very bitter and should not be used unless it is to be flavored with fruit juice.

Albumenized Milk

6 ounces ($\frac{3}{4}$ glass) fresh whole milk. 1–2 eggs (whites only)

Have the milk thoroughly chilled.

Clip egg whites with scissors and strain through cheesecloth to remove stringy parts. Now stir into the milk with a fork.

If patient does not object to foam, the mixture may be placed in a milk shaker with pieces of ice and shaken until creamy, then poured over cracked ice.

Buttermilk (Bulgarian)

1 qt. fresh whole milk (or skimmed if desired)
1½ to 2 oz. (Bulgarian) starter, or 1 buttermilk tablet [1]

If latter is used dissolve tablet in 1 gill of cold water.

Stir the buttermilk starter into the cold milk and place in a one-half gallon glass jar, place the cover on loosely and allow the jar to stand for 12 hours or until the milk is well clabbered. (Insert a thin-bladed knife close to the jar so that the rest of the milk is not disturbed to see if the coagulation is complete.) When this is accomplished place the jar in the ice-box. After the milk has become thoroughly cold, beat thoroughly. The mixture is like any well-made buttermilk. If the cream is removed before adding the culture the milk will be of lower nutrient value, but in many cases this is necessary since it is often the fats which cause a disturbance.

Lactone Buttermilk

627 calories

1 qt. fresh milk — 1 gill cold water
1 lactone tablet (or 1½ oz. buttermilk starter)

(Parke, Davis & Co.'s and Hansen & Co.'s buttermilk tablets are practically the same.)

Dissolve tablet in cold water and stir into fresh milk (which may or may not be skimmed, according to the directions of the physician, but the finished product is more palatable using whole milk). Pour into a clean jar or wide-mouthed bottle; plug with cotton or close not tightly, allow to stand in room temperature 70°–75° F. for 24 hours, shaking the bottle occasionally to keep the cream from rising. At the end of this time pour the milk out (if sufficiently fermented), and beat briskly for 5 to 6 minutes with egg beater or with churn, place on ice until ready to serve.

[1] Buttermilk Tablets may be purchased from the Chas. Hansen & Co. Lab., N. Y., or from Parke, Davis & Co. The Buttermilk Starter is prepared by the first mentioned firm and is ready to use, directions coming with each sample.

Albumenized Milk Shake

130.6 calories

6 oz. (¾ glassful) fresh whole milk — 1 egg white

Place the milk on ice to become thoroughly chilled. Clip the egg white with scissors and strain through cheesecloth to free it from strings; stir into cold milk. If patient does not object to foam, the milk and egg whites may be placed in a milk shaker, and agitated for 4 or 5 minutes, then poured over cracked ice. This beverage may be flavored to suit the taste of patient. Vanilla, caramel, or coffee may be used to give variety.

To add additional nourishment 1 teaspoonful of Sanatogen, or Plasmon may be added, or 1 tablespoonful of Panopepton or liquid peptonoids used instead of the casein products.

Milk Punch

373.5 calories plus 13 when egg is added

4 oz. rich milk — 1 tbs. whisky (or sherry)
2 oz. cream — 1 tbs. sugar (or less)
1 egg white (if additional nourishment is desired)

A grating of nutmeg on top. Place ingredients in shaker as directed above, and shake a few minutes to thoroughly mix ingredients. Pour over cracked ice, grate nutmeg or cinnamon over the top. The milk may be peptonized if necessary, using ½ tube of Fairchild's peptonizing powder.

Peptonized Milk Punch

196.7 calories

Take a goblet about one-third full of finely crushed ice, add a tablespoonful of St. Croix rum, a dash of curaçao or any liquor that is agreeable to the taste; fill the glass with "specially peptonized milk," stir well, and grate a little nutmeg on top. Add 1 tablespoon sugar.

"Specially peptonized milk" [2] may be used in the same way as fresh milk in making punches — with St. Croix rum or Jamaica, or any spirits that may be preferred.

Plain Eggnog

233.7 calories

1 egg	1 tbs. rum
2 tbs. cream	1 tbs. whisky
1 tbs. sugar	

Beat yolk of egg and sugar together; add cream, rum, and whisky. Beat egg white stiff and stir into the mixture; pour into glass with or without cracked ice.

Nutmeg may be grated over top for those who like it.

Orangeade

81 calories

Juice of 1 orange	Juice of ½ lemon
1 tbs. sugar	Enough water to fill the glass

Sweeten the juice of orange and lemon and pour into a glass filled with crushed ice. Fill glass with plain or carbonated water.

Albumenized Orangeade

107 calories

Make orangeade as directed in above recipe, without the addition of water. Break the whites of 2 eggs into a saucer and with scissors cut the albumen until free from membrane and strain, stir this into the orange juice and add several pieces of cracked ice. This is both nourishing and palatable, and the taste of the egg cannot be detected.

Albumenized Lemonade

73 calories

Juice of 1 lemon 1 tbs. sugar

Whites of 2 eggs

[2] See Fairchild's Formula.

Cut as directed for Albumenized Orangeade. Mix until sugar is dissolved. Pour over a glassful of cracked ice. Fill glass with plain or carbonated water.

Albumenized Grape Juice

146 calories

Albumenized Grape Juice is made without the addition of lemon juice unless the white grape juice is substituted for the black, in which case add one or two teaspoonfuls to relieve the flat taste and proceed as in Albumenized Orangeade, using 3 oz. of grape juice.

Milk and Ginger Ale (or Sarsaparilla)

3 oz. milk — 3 oz. ginger ale or sarsaparilla

Pour into a milk shaker and shake with cracked ice until foamy.

Malted Milk (1)

1 tbs. malted milk — 6 oz. boiling water
1–2 tsp. sugar — ¼ tsp. salt, 3–5 drops vanilla

Heat water to boiling and mix malted milk (Horlick's) with a little cold water. Stir into the boiling water, add sugar and salt, and serve with or without cream.

Malted Milk (2)

½ to 1 tbs. malted milk — 1–2 tsp. sugar
3 oz. each milk and water or ¼ tsp. salt

Proceed as above.

Malted Milk Chocolate or Cocoa

1 tbs. malted milk — 2 oz. water
1 tbs. cocoa or grated chocolate — 1–2 tsp. sugar
6 oz. milk — 4–5 drops vanilla extract

Mix cocoa or chocolate with water and boil 2–3 minutes. Pour milk into a double boiler and heat, mix malted milk with a

little water and stir into the hot milk, add the cocoa paste, sugar, and vanilla, mix thoroughly, beat the mixture briskly to mix ingredients thoroughly, and serve with or without cream.

Malted Milk Eggnog

1 egg	1 tbs. sherry wine or whisky
1 tbs. malted milk	½–1 tbs. sugar
4 oz. milk	1 tsp. cream

Mix milk as directed above and chill thoroughly. Beat egg yolk with sugar and whisky or wine and add to the mixture. Beat egg white stiff and stir into the rest of the ingredients. Pour into shaker and shake with cracked ice until thoroughly chilled. The cream may be served on top, or beaten into the eggnog.

Egg White and Mint

60.5 calories

1 egg	1 tsp. lemon juice
2 tsp. sugar	Several sprigs of fresh spearmint

Whip white of egg; add sugar and lemon juice. Crush lower parts of mint leaves slightly and place in glass. Pour mixture over ice in glass; stir well and serve at once.

Fill glass with carbonated water, Vichy, White Rock, Apollinaris, etc. This is especially good when patient suffers from nausea.

Champagne Mint Julep

Two drops of Angostura Bitters on one lump of cut sugar.

Dissolve sugar in one tablespoonful of water. Place in glass of cracked ice with several sprigs of fresh spearmint, and fill the glass with any sweet champagne. Stir the mixture before serving.

As a beverage, California champagne will answer admirably in this recipe, as sweet champagne is preferable to the dry.

Panopepton and Liquid Peptonoids Eggnog

280 calories

Is made as directed for plain eggnog, panopepton being substituted for the rum, using 1 ounce instead of 1 tablespoonful. This will probably more than fill a glass, but the whole amount must be made to keep the proportions correct. The whisky may be left in, if desired, or sherry wine may be substituted in its place to give flavor and additional stimulation.

Coffee Eggnog

Follow recipe for plain eggnog, substituting 2 tablespoonfuls of strong coffee for the rum.

Pineappleade

100.9 calories

2 oz. ($\frac{1}{4}$ cup) grated pineapple
8 oz. (1 cup) cold water, or sufficient quantity carbonated water to fill glass
Juice of 1 lemon
1 drop of lemon extract or a little of the peel, grated
1 tbs. sugar

Mix lemon juice, water, and pineapple together; add sugar, if not sweet enough, but the less used the better, in all beverages. Add extract and pour into a shaker with a few lumps of ice. Shake well to mix ingredients and pour the pineapple over crushed ice. If this proves too much at a time, make half the recipe. Serve in tall thin glasses holding from 4 to 6 ounces after the ice is put in, or serve in punch glasses with small spoons.

Cream Egg and Vichy

376.7 calories

1 egg white
2 tsp. sugar
3 oz. (6 tbs.) cream
A few drops of vanilla extract
Celestine (French) Vichy to fill glass

Whip egg white to stiff froth; whip cream stiff and sweeten, add vanilla; lastly, the egg. Pour over cracked ice and fill up the glass with Vichy.

Cocoa

231.6 calories

2 tsp. cocoa	½ cup boiling water
1–2 tsp. sugar	⅔ cup milk

Mix cocoa and sugar together and add boiling water slowly. Boil 3 to 5 minutes; heat milk in double boiler and add cocoa mixture. Beat with Dover egg beater to distribute cocoa and prevent scum forming. Serve with or without whipped cream. Cocoa may be reinforced as directed in "broths" with albumen or the whole or yolk of one egg well beaten. If the white alone is used, care must be observed that the liquid is not hot enough to coagulate the albumen. Proprietary foods and casein preparations are used in like manner.

Coffee

2 tbs. ground coffee	1 cup boiling water
2 tsp. white of egg	¼ cup cold (boiled) water

Mix coffee with 1 tablespoonful of cold water and egg white in small pot (after scalding pot), add boiling water; allow to boil 3 minutes; stir down and add cold water; set pot where coffee will stay hot, but not boil, for 10 to 15 minutes, serve with cream and sugar or use to flavor hot milk.

Broths

Method of Making Standard Broths

(Beef, mutton, veal, and chicken)

140 calories

With rice, 240 calories; with barley, 320 calories

Two pounds of meat (beef, mutton, veal, or chicken); 2 quarts of water; 2 pounds of bones; 1 teaspoonful of salt; 2 tablespoonfuls of rice or barley may be added if desired and parsley or celery may be used to give the additional flavor.

Wipe meat with a clean wet cloth and cut into small pieces, break the bones, place all together in a deep saucepan, cover closely and allow to stand in a cool place for one hour; then place pan on the back part of the stove, or on an asbestos mat over a gas burner, and heat gently to the boiling point (broth must never do more than simmer), allow to simmer for three or four hours, skim, strain, and cool. When thoroughly cold, remove all of the fat, using blotting paper to absorb the fine particles of grease. If parsley and celery are to be used to flavor the broth they may be added during the last hour of cooking. Barley requires to be soaked overnight when it is used in broth; rice should be soaked one hour. When either are to be left in the broth it is better to cook the broth for three hours, strain, return to the fire, adding the rice or barley. Allow it to simmer for an hour or more and proceed as directed. When the broth is taken from the fire, it should be measured, and boiling water added to bring the amount up to the original quantity. This will give what is known as standard broth. Bouillon is clarified broth, most of the already small amount of nutrient material being thus strained and cleared from the broth, leaving a liquid of practically no fuel value.

Clam or Oyster Broth

11.5 calories without milk; 162.5 calories with milk

1 doz. clams or oysters — 1 pt. water or
1 tbs. whipped cream — 1 cup each milk and water
A dash of pepper

Scrub clams and place in an iron spider and allow to heat gently until the shells open. (When oysters are used allow to heat until the edges curl.) Chop, cover with hot water, and allow to simmer 15 minutes, strain through cloth, add salt and a dash of pepper.

If milk is to be used in place of part of the water, add it during the last 5 minutes of the cooking. Clam broth without milk may be served hot or cold; it will not jelly as other broths but may be frozen if desired.

Clam Broth

Without milk, 55.6 calories; with milk, 113.4 calories

½ cup (4 oz.) clam juice	Salt and pepper to taste
½ cup hot water or milk	1 tbs. whipped cream

Mix clam juice (bottled) with water; heat, add salt and pepper, pour into cup, place whipped cream on top, and serve at once.

Beef Juice

One-fourth pound lean beef. Wipe clean with damp cloth, cut in inch pieces and sear on a hot griddle, place in a meat press and remove all juice from meat. Care must be taken not to cook the meat. The juice may be reheated by placing in a hot cup in hot water, not allowing the temperature to exceed 155° F.

Chicken Jelly

308 calories
1 serving, 75.8 calories

½ small chicken	1 tbs. gelatine soaked in
3 pt. water	¼ cup cold water
½ cup celery	½ tsp. salt
1 sprig of parsley	¼ tsp. red pepper
	1 egg white

Cut the chicken in pieces, break the bones, place in a saucepan with all of the ingredients except the gelatine and egg white, cover with the water and boil until the meat falls from the bones. Press out as much of the juice as possible, strain and allow to cool, remove all of the grease, and return to the fire. Reduce to 1 pint; add the gelatine, stir in the beaten egg white, and allow to boil 5 minutes, strain again into molds and set aside to congeal.

Calf's-foot Jelly

376.6 calories

2 small calf's-feet
½ small fowl
1 cup of Rhine wine
1 lemon
½ stick of cinnamon
1 egg white (well beaten)

Cut the fowl and the calf's-feet into small pieces and place them in a saucepan with 3 pints of cold water and the cinnamon. Cook until the meat falls from the bones (the quantity should be reduced to 1 pint). Strain and squeeze out as much of the juice as possible, allow to cool, and remove all of the grease. Add wine and lemon juice (and sugar if desired) and reduce the amount of broth one-half, add the egg white and allow to boil 5 minutes. Clear and strain into molds.

Tomato Jelly

103 calories (plain)

1 cup tomatoes (canned)
¾ cup water
6 cloves
½ cup celery
¼ cup vinegar
1 tbs. of parsley
½ tsp. red pepper
1 tbs. granulated gelatine soaked in ¼ cup cold water

One slice of onion may be added if there is nothing to contraindicate it, but care must be taken in adding onion, as it is apt to disagree with many people. Boil all of the ingredients together (except the gelatine) for 20 minutes, press through a sieve, then through a cloth, return to the stove and allow to boil up; add the gelatine and boil 5 minutes; strain into wet molds.

One-half cup each of chopped chicken and celery or ½ cup of chopped nuts may be added to the jelly before it congeals if desired, but care must be taken not to add anything without finding out whether or not it is contraindicated.

Cream Sauce for Cream Soups

2 tbs. flour
2 tbs. butter
1 pt. milk or thin cream
½ tsp. salt

Cream butter and flour to a smooth paste, heat milk in double boiler on an asbestos mat over the flame; when it is scalding hot, stir in the butter and flour paste, stir until smooth and the mixture begins to thicken, cover and allow to cook without boiling for 15 minutes; strain. The sauce may be used at once or put into a glass jar in the ice-box until needed.

Cream of Asparagus Soup

199 calories

⅔ cup cream sauce ⅓ cup asparagus purée

Heat sauce and purée in separate saucepans, and when about ready to serve, stir them together, strain carefully, season with salt, and serve with or without croutons of toast or whipped cream. If the sauce is made from the cream instead of milk, the fuel value will be much higher (302.7 calories).

Cream of Asparagus

296 calories

8 medium stalks of asparagus 1 tsp. salt
1 qt. water 1 tbs. flour
½ cup cream sauce

Cut off the tips of the asparagus in 1-inch pieces, and place with the rest in a saucepan, and cover with water; add salt and cook until the tips are tender; lift out and put aside to be used instead of the toast croutons. After the water in which the asparagus is cooked is of sufficiently strong flavor, strain and add the extra spoonful of flour, mixed in a tablespoonful of water; cook 15 minutes, measure ½ cupful, and proceed as directed above.

Cream of Potato

269 calories

1 medium size potato ¼ tsp. salt
¾ cup milk ½ tbs. each flour and butter

Boil and cream the potato. Make sauce and add potato purée; stir until well blended and serve with toast croutons.

When boiling potato if a sprig of parsley is added and strained out, and a little of the potato water is used to make the purée smooth, the soup will have more character.

Oyster Soup

199.6 calories

6 oysters	¾ cup milk
1 cracker (soda) or	¼ tsp. salt
8 oyster crackers	A dash of pepper

Put oysters (and their liquor) into a saucepan, and heat gently; skim thoroughly. Heat milk in separate pan; when very hot add to oysters. Roll the cracker and add to soup just before it is served. Add salt and pepper at the same time.

Cream, Spinach, Celery, Pea, or Carrot Soup

300 calories (approximately)

¾ cup cream sauce	⅓ cup vegetable purée

Proceed as in making cream of asparagus soup.

Eggs

Method of Preparation

Eggs, like other protein foods, must be cooked at a low temperature to be digestible. A properly cooked egg should be tender and delicious. Boiling toughens the albumen and prevents its ready digestion, while cooking just under the boil gives an egg whose white is of the consistency of jelly. To cook to a firmer consistency it must be left in the hot water, but not boiled, for a longer period; see below.

Coddled Eggs

61 calories

1 pt. water	1 egg

Allow water to boil; wash egg; drop into boiling water and place saucepan where water will keep hot, but not boil; allow to stand 7 to 8 minutes. Serve with salt.

Soft-cooked Eggs

61 calories

Proceed as for coddled eggs, but allow egg to remain from 10 to 15 minutes or even longer, if very soft eggs are not desired.

Poached Eggs

61 calories

Have small, shallow saucepan half filled with boiling water or milk — if an egg poacher is at hand, use that; otherwise, lower a flat perforated spoon into water and place where the water cannot boil. Break the egg carefully into the spoon, taking care not to break the yolk; allow to stand in hot water until the white is of the consistency of jelly; lift out — slide egg on to hot toast, taking care not to break. (A broken poached egg is very unappetizing, as well as untidy in appearance.)

Creamed Egg on Toast

With cream, 175.5 calories; with milk, 117.0 calories

Cut the crust from one slice of bread and cut bread in one-inch cubes; toast while preparing egg. Beat egg with egg beater until light colored; stir into it 2 tablespoonfuls of rich milk; pour into a double boiler, over hot water; add 1 teaspoonful butter, a little salt and pepper; stir until like thick boiled custard. Pour over toasted cubes of bread and serve at once.

Egg Nests

188 calories

1 egg
$\frac{1}{2}$ tbs. butter
1 slice of bread ($\frac{3}{4}$ in. thick)
Salt and pepper to taste

Toast the bread on one side, butter and place on a plate (one which will not break in the oven).

Beat egg white stiff, and pile roughly upon the toast, leaving a slight depression in the center. Slip the unbroken yolk into the depression (take care not to break the egg yolk or the appearance and significance of the dish will be ruined). Set plate in oven to brown the white (the oven must not be too hot or the white will brown before the yolk is sufficiently cooked to be palatable). Place the remaining butter on the yolk; dust with salt and pepper and serve at once.

Foamy Omelet

1 egg	½ tbs. butter
1 tbs. water	⅛ tsp. salt and dash of pepper

Beat yolk until light colored and thick; add water, salt, and pepper. Beat white until stiff and dry. Turn the yolk over the beaten white and cut and fold the white into the yolk mixture.

Have pan hot and buttered, turn in the mixture, spread evenly in pan and allow to stand about two minutes on the top of the stove at a moderate heat; then remove the pan, place in a moderate oven and cook until a knife thrust into the center comes out nearly clean. Remove from oven, cut across center at right angles with handle of pan and turn over on a hot platter. Omelets may be varied by the use of different garnishes and flavors.

Cream Toast

102.6 calories

1 slice bread	1 tsp. flour
¼ cup thin cream	1 tsp. butter
	¼ tsp. salt

Cream butter and flour together cold, and stir into hot milk. Stir until the mixture begins to thicken, cover the boiler and allow

to cook for 15 minutes. Slice the bread and cut into cubes; toast a delicate brown, and pour over it the cream sauce. Strain the sauce if there are any lumps.

Milk Toast

102.6 calories

1 slice bread, toasted	¼ cup milk, heated
1 tsp. butter	⅛ tsp. salt

Toast the bread on both sides and butter; place in a deep plate and pour over it the hot milk.

Wine Panada

184.4 calories

2 water crackers	½ cup hot or cold milk
2 tbs. sherry wine	¼ tsp. grated nutmeg

Sugar may be sprinkled over crackers if desired, but it is not ordinarily done.

Place the crackers in a deep plate and pour over each cracker 1 tablespoonful of wine, dust with nutmeg and pour over the hot or cold milk.

Bran Gems No. 1

547.7 calories

2 tbs. molasses	1½ cup bran
½ tsp. salt	½ tsp. soda
½ cup milk	1 egg

Mix soda into bran, add salt, stir milk and molasses together and stir into bran; add well-beaten egg. Bake in 6 well-greased gem pans.

Bran Gems No. 2

653.6 calories

1½ cups bran	1 egg
1 tbs. sugar	1 cup milk
2 tbs. melted butter	2 tsp. baking powder

Mix together and bake in 6 well-greased gem pans.

Bran Biscuits

463.1 calories

1 cup bran
½ cup wheat flour
½ tsp. salt
2 tbs. butter and lard mixed
1½ tsp. baking powder

About ¾ cup of milk. (If this is not sufficient to make a soft dough, add more.)

Mix flour, bran, salt, and baking powder together. Mix in the butter and lard. Add milk to make dough mold into biscuits and bake in a quick oven 10 to 12 minutes.

Bran Cookies

188.3 calories

½ cup sugar
½ cup molasses
½ cup milk
¼ cup butter
½ cup flour
1 cup bran
1 tsp. cinnamon
1 tsp. ginger
½ tsp. cloves
½ tsp. nutmeg
2 eggs
½ tsp. salt

Cream butter and sugar together. Sift the spices and salt into the bran and flour. Add eggs and milk to butter and sugar. Stir in the bran mixture. Drop from spoon on to a greased paper. Bake in a quick oven.

Almond Biscuits

209.4 calories

To each ounce (2 tablespoonfuls) of almond flour, add whites of two eggs and salt to taste.

Add salt to eggs; beat until stiff; add almond flour and bake in small buttered pans for 15 to 20 minutes. The whole process must be done quickly, and baked as soon as the ingredients are mixed.

Almond Cakes

319.8 calories

1 lb. almonds ground	2 tbs. milk
4 eggs	1 pinch salt (⅛ tsp.)

Beat eggs light; add salt, milk, and almond flour; bake in 12 flat buttered tins in a moderate oven for 15 minutes.

Cornmeal Gruel

100 calories

2 tbs. corn meal — 1 cup water

½ tsp. salt

Allow water to boil, mix corn meal with 3 or 4 teaspoonfuls of cold water. As soon as water begins to boil, stir briskly until gruel begins to thicken. Then place on a cooler part of the stove, and cook gently for 2 hours, replacing water as it evaporates. Strain through a coarse sieve if it lumps.

Farina

171 calories (2 servings)

3 tbs. (1 oz.) farina	½ cup boiling water
½ cup rich milk	¼ cup cold water

¼ tsp. salt

Mix farina into a paste with cold water. Stir into boiling water, allow to cook for half an hour (if water boils out, add boiling water). Add milk, and place the saucepan in a hot water bath (double boiler); allow to cook half an hour longer, stirring occasionally.

Rice (No. 1)

99.4 calories

2 tbs. (1 oz.) rice — 1 pt. boiling water

½ tsp. salt

Soak rice for 1 hour in cold water. Sprinkle into the briskly boiling water, taking care not to stop the boil. Allow to cook until tender; test by pressing a grain between thumb and finger; there should be no hard center. When the rice is done, turn it into a colander and allow water from cold faucet to run over it to wash off surplus starch. Return to saucepan; place on stove where moisture can be dried out of the rice without burning it.

Rice (No. 2)

217 calories (2–3 servings)

4 tbs. rice	¾ cup water
¼ tsp. salt	¾ cup milk

Wash rice and soak it in cold water for 1 hour (or overnight). Place in an earthenware baking dish, cover with the milk, water and salt. Cover and set in the oven; allow to cook until all of the moisture is absorbed (if the rice is not done by the time the moisture has evaporated, add more milk, or milk and water, and continue until the grains are tender). If the given amount of moisture is not absorbed by the time the rice is tender, drain off the surplus and return the dish to the oven for a few moments. Each grain should be separate, when the dish is prepared correctly.

Vegetables

Baked Potato (White)

1 potato weighing about 3 ounces; scrub well with a brush; dry and slightly grease surface, place in moderately hot oven and bake about 45 or 50 minutes. (The potato should feel tender upon pressure.) When done, make an incision of 1 inch in the skin and gently press out the steam; cover closely with cloth and keep in a warm place until ready to serve. Put 1 teaspoonful (about ⅛ ounce) of butter in the cut and serve very hot.

Creamed Potato

¼ tsp. salt	2 tsp. milk
1 medium size potato	1 tsp. butter

Pare and boil potato until tender when pierced with a fork; drain off the water and return the saucepan to the stove; shake the pan (to prevent burning) until the potato looks dry; mash with fork or potato ricer, add milk, butter, and salt. Beat briskly until creamy. Serve at once or brown in oven.

Potato Stuffed with Meat

155.2 calories

1 potato (baked)	1 tbs. cold chopped beef
¼ tsp. salt	1 tsp. butter
Dash of pepper	

Bake potato, split in half and remove the contents, mix with the chopped meat, add salt, pepper, and butter; return to the two halves, set in oven to brown, then serve at once.

Scalloped Potatoes

163.1 calories

1 potato	¼ cup milk
2 tsp. butter	

Boil potato, not quite tender, and slice in moderately thin slices; arrange in layer in an individual earthenware baking dish (ramekin), add butter in bits between layers, pour the milk over; set dish in oven, cover and bake slowly for 15 minutes, until most of the milk is absorbed and the potatoes are nicely browned on top. In cases where the patient is allowed cheese, 2 teaspoonfuls may be sprinkled between the layers, giving 31 additional calories.

Peas [3]

149.2 calories

½ cup fresh peas	1 tsp. butter
1 pt. boiling water	¼ tsp. salt

[3] Canned peas may be substituted for fresh ones. Fuel value 62.8 calories, with butter, 98.8 calories.

Add salt and peas to boiling water; allow to cook from 30 to 60 minutes, or until they are perfectly tender, drain and add butter and additional salt if necessary, or 1 tablespoonful of cream sauce. In gastro-intestinal disorders and with young children, it is best to press peas through sieve or remove the indigestible parts.

String Beans [4]

83.2 calories

1 cupful of string beans (measured after the strings are removed and the beans cut into small pieces)
1 tsp. butter ½ tsp. salt

Cover with boiling water and cook until tender, drain, and serve hot.

Spinach

94 calories (About 2 servings — 8 oz.)

2 qts. spinach ½ tsp. salt
2 tsp. butter

Wash thoroughly through about ten waters, until spinach is entirely free from grit, remove the tough stems, lift the spinach from water and place in a saucepan without additional water, sprinkle over with salt, cover saucepan and cook until tender (requires about 15 minutes). Cut very fine with sharp knife, or press through sieve, add butter and serve hot.

Carrots (with Cream Sauce or Butter)

130.3 calories — 80.4 calories

Carrots, about ½ cupful after they are cut in cubes, or 3½ ounces. Serve with 2 tablespoonfuls of cream sauce, or with 2 teaspoonfuls of butter and a little salt and pepper. Scrub carrots and scrape off the skins; cut into slices or cubes, drop into slightly salted

[4] A one-inch piece of salt pork may be cooked with the beans and removed before serving in place of the butter.

boiling water and cook until tender; drain and add butter or cream sauce.

Whole Tomato Stuffed with Rice

151.4 calories

1 medium size tomato
2 tbs. rice (uncooked)
1 tsp. butter
Dash of pepper and salt

Remove the center from the tomato, dust the inside with salt and a very little pepper and set aside. Boil the rice, when about half done (10 minutes) add the tomato pulp, from center of tomato. Cook 10 minutes longer, drain the water from the rice, add the butter, salt, and a little pepper. Fill the center of tomato with rice. Set the tomato upon a greased paper and bake in a moderate oven for 20 minutes.

Broiled Tomatoes

385 calories

Slice 1 tomato in three or four slices
1 tbs. butter
1 slice of bread (round preferred)
¼ cup of cracker crumbs
Salt and pepper

Heat broiler or frying-pan very hot, grease lightly; season crumbs with salt and pepper; dip slices of tomato in cracker crumbs, covering both sides well, and place upon the broiler; when one side is browned, turn over carefully, to prevent breaking, and allow the other side to brown. Lift the broiler to the lower half of the oven and let the tomatoes cook gently for 10 minutes. Place bits of butter upon each slice, then arrange these on the buttered toast.

Stewed Tomato on Toast

170 calories

½ cup canned tomatoes
½ cup water
1 slice bread
2 tsp. butter
¼ tsp. salt

Pour tomatoes and water in a saucepan and allow to cook slowly for 20 minutes, add salt and a dash of pepper. Toast and butter the bread, pour the cooked tomatoes over it and serve at once.

To Broil Squab or Quail

1 quail on toast, 409 calories

1 squab, 442 calories

Split down the back and place on the broiler, cut surface uppermost. Or place upon a hot pan, cut surface next to the hot surface so that the cut side may sear quickly, thus keeping in the juices instead of having them wasted in the pan by slow cooking. The process requires about 15 to 20 minutes. Serve on toast, with butter, pepper and salt.

Quail or squab cooked inside the stove is often more palatable than that cooked on a broiler. The bird is split as for broiling, and placed in a small pan just large enough to hold it; a strip of bacon pinned about the breast; add 1 tablespoonful of butter in bits, dust the cut surface first with salt and pepper, then with flour; add ½ cup of hot water. Turn another pan over the bird (it must fit closely to keep in the steam), place inside the oven and cook about 10 minutes; turn the bird over and cook 10 minutes longer. Lift the bird from the pan and place it where it will keep hot, add a tablespoonful more water and a teaspoonful more flour to the gravy in the pan, stir briskly to remove any lumps, remove bacon and place the bird upon a slice of nicely browned toast; pour over it the gravy, garnish with a sprig of parsley, and serve at once.

When steak or chops are served, parsley or sliced lemon may be used as garnishes. Chops may be served garnished with green peas, and the beefsteak served with potatoes cooked in any way; all meats should be served very hot. It is best to cover with a plate.

Bacon

2 slices, 100 calories

Select bacon with a strip of lean and fat, slice thin and place upon the broiler, place a pan beneath the broiler to catch the

drippings and prevent the bacon from catching fire. Cook until nicely brown on one side and turn, repeating the process. Serve alone or with liver, beefsteak, or chops.

Chicken (One Half)

438.4 calories

Split small chicken (broiler) down the back, flatten the breast bone with knife before placing upon the broiler, proceed as in broiling birds, allowing from 25 to 30 minutes for the process. Chicken is very palatable and dainty if cooked after the manner described in cooking quail and squab inside the stove. The process is called smothering. Serve upon buttered toast, garnished with parsley.

Birds or Chicken à la Bain Marie

1074 calories; 1 serving, 134 calories

1 small chicken, or bird
2 tbs. butter
1 tbs. parsley
Salt and pepper

Split birds or chicken as for broiling, place one half in a chafing dish or double boiler (bain-marie), dot the cut surface with butter, sprinkle over it the parsley, dust with pepper and salt; place the other half of the chicken or bird on top of this, add the rest of the butter, dust with salt and pepper, cover, and place the pan over the hot water pan; allow to steam for about 1 hour, lift from hot water pan and place in oven or under the flames to brown lightly. Serve on buttered toast.

Roasted or Baked Chicken, Turkey, or Duck[5]

408.6 calories

Draw the fowl and wash thoroughly inside and out. (If it is purchased from the market, it is well to wash the inside with soda water to remove any stale flavor that may be present.)

[5] 3½ ounces: chicken, 224 calories; turkey, 284.9 calories; duck, about 257.3 calories.

Make a dressing from one-third of a small loaf of bread broken into small pieces; ¼ cup chopped celery, 1 tablespoonful of chopped parsley, 1 tablespoonful of butter and one egg beaten lightly. Stuff the cavity with dressing, sew up the opening and place in dripping pan. Place pan under the flame for a few minutes to brown, unless a regular roasting pan (savory roaster) is used; allow to bake from 45 minutes to an hour and a half for chicken and duck according to the size, and from an hour and a half to three hours for turkey according to size. A cupful of boiling water may be poured into the pan in which the chicken, etc., is being roasted and flour may be sifted over the top; dust with salt and pepper. When an ordinary pan is used for baking, the fowl will require frequent basting to keep it moist and tender. Just as the baking is finished, more butter, flour, and seasoning may be added, with a cup or more of boiling water to make additional gravy.

Sweetbreads

287.5 to 208.8 calories

¼ set of sweetbreads	½ tsp. of salt
1 lemon	¼ tsp. of pepper (red)

Wash sweetbreads carefully and allow to stand 1 hour in ice water, allow the water containing the lemon juice, salt and pepper to come to a boil and drop in the sweetbreads, cook for 15 or 20 minutes or until tender when pierced with fork. Remove from hot water and pour ice water over them to blanch. Serve either in cream sauce or split in half and broil upon a slightly greased broiler until light brown; season with a dash of salt and pepper (about ⅛ of a teaspoon of pepper mixed) and 1 teaspoon of butter, serve on toast garnished with parsley.

Broiled Fish

3 ounces, 172.9 calories

Split down the back, and broil as beefsteak. Fish does not require more than from 10 to 15 minutes to broil unless very large. Serve with teaspoonful of parsley and butter.

Fish Steaks, Stuffed with Oysters

3 ounces, 168.3 calories
Halibut, trout, or any good baking fish, 235.8 calories

2 slices of fish	1 cup bread crumbs
1–1½ in. thick	4 tbs. butter
1 doz. oysters	Salt and pepper

Lay fish for one hour in a French dressing made from ½ cup of oil, ⅓ cup of vinegar, salt and pepper; drain and place upon slices of bacon, placed upon a fish sheet or dripping pan. Dip oysters first in melted butter, then in bread crumbs, and place upon the slice of fish, adjust second slice above, cover top with bread crumbs, dot with butter and bake 30 to 45 minutes in moderate oven. Serve with hollandaise sauce.

Broiled Oysters

182 calories

6 oysters	1 slice toast
2 tsp. butter	Salt and pepper to taste

Grease broiler or hot frying pan slightly, place oysters upon the heated surface and place under the flame or on top of the stove; cook until the edges curl (2 to 3 minutes), lift to a hot dish containing the butter, place toast upon small plate (toast and plate must be hot), dispose the oysters upon the toast, and pour over them the butter.

Lobster or Crab

1 serving lobster, 157 calories
1 serving crab, 154 calories

1 lobster, or	1 tbs. butter
1 crab	2 tsp. butter
2 tbs. bread crumbs	¼ tsp. salt
	⅛ tsp. pepper

Boil lobster or crab until bright red, lift from boiling water.

Split lobster down the back and carefully remove cord, gall sack, and sand bag before broiling or serving. Serve with melted butter.

Pick meat from shell of crab, and mix with salt, pepper and butter. Stuff into shell. Cover top with bread crumbs, and brown in the oven.

Hollandaise Sauce

161.5 calories
1 tablespoonful, 26.9 calories

1 egg (yolk only)	1 tbs. butter
2 tbs. lemon juice	¼ cup boiling water

Salt and pepper to please

Beat egg yolk with lemon juice; add one-half the butter; place in double boiler over hot (not boiling) water. Stir until it begins to thicken and add remainder of butter; stir in boiling water, cook until of the consistency of boiled custard.

The Cooking of Meats

Veal Cutlets

2 cutlets, 203 calories

Dip cutlets first in egg (mix one yolk with 1 tablespoonful of water) then in bread crumbs; pan broil (grease the frying pan slightly), or broil under the flame as directed in cooking beefsteak. Veal cutlets may be served plain, or with tomato sauce.

Cutlets or chops may be cooked in paper bags if desired. Wrap the chop in a thin slice of bacon, grease the paper (a piece of heavy brown paper), place the chop inside and secure the ends with paper clips or pins; place in a pan and cook in the oven, or under the flame. It is wise to slip the bag containing the chop inside of another bag; in this way the meat will not taste of scorched paper if the outer bag should burn.

Beefsteak

266.3 *calories*

3 inches long by 2 inches wide by 1½ inches thick (weighing about 3 ounces).

Wipe steak off with a wet cloth and dry before cooking. Slightly grease the broiler and place under the flame, count ten as the clock ticks and turn the steak over, count ten again and again turn; continue this for about 3 minutes or until the steak is seared upon both sides, lift the broiler to a lower part of the oven and continue the cooking for 5 to 8 minutes; run a sharp-pointed knife between the meat and the bone (if the steak is a porterhouse or sirloin), and if the flesh is red, continue the cooking a minute or more. If it is pink, lift to a hot plate, place 1 teaspoonful of butter upon it, dust the surface with salt and pepper and serve hot. Pan broiling is done on the top of the stove in a flat frying pan. Wipe the pan with a clean wet cloth, place upon the stove and heat piping hot, and place the steak (without greasing the pan) upon the hot surface. Proceed as in broiling under the flame. After the first 3 minutes of cooking, place the pan on a cooler part of the stove to finish the cooking.

Lamb or Mutton Chops

2 chops, 339 calories

1 to 2 inches thick will require from 10 to 15 minutes' cooking. Scrape the bone clean and wrap in paper or dough to prevent the bone from becoming charred. Proceed as in cooking beefsteak.

Salads

Tomato 1. Peel tomato cut almost through to form six parts like a flower; place on lettuce leaf and serve with French dressing or mayonnaise; 142.8 calories with 1 tablespoonful of French dressing; 49 calories with 1 teaspoonful of mayonnaise.

Tomato 2. Peel tomato and remove the seeds and pulp; fill hollow with chopped celery, mixed with mayonnaise. 114 calories.

Lettuce, chicory, romaine, and cress must be washed until thoroughly clean in cold water; discard all tough leaves and fibers; lift from water, shake off water; wrap in towel and place on ice to become crisp. If this is impossible, leave in cold water until ready to serve, then dry the leaves on a soft towel. Serve with French dressing or mayonnaise.

Cucumber. Peel, slice, and stand in cold water 1 hour before serving; dry, dress with a teaspoonful vinegar, 1 of oil, a little salt and pepper. 1 serving, 50 calories.

Fruit Salads (6 servings). 3 grapefruit, 1 cup celery.

Method I. Remove skin and seed from grapefruit and break into several pieces. Cut celery, mix with French dressing. Serve in baskets made from grapefruit shells; garnish with rings of green pepper. 1 serving, 130.2 calories.

Method II (6 servings). Peel 5 oranges, remove inner skin and seed, break into small pieces; do not bruise fruit, allow to stand 20 minutes in French dressing; drain, place on lettuce leaf, or in half of orange skin, and pour over it fresh French dressing; garnish with rings of green pepper. 1 serving, 202 calories.

French Dressing

136.8 calories

1 tbs. oil — ⅓ tbs. vinegar, or lemon juice

Dash of pepper and paprika

Have all ingredients cold; mix salt and pepper together; stir in the oil, add vinegar or lemon juice slowly, beating briskly to form an emulsion; use immediately or ingredients will separate.

Use as little salt as possible in nephritic conditions.

Mayonnaise

2100 calories

1 teaspoonful, 29.4 calories

1 egg (yolk only)
2 tbs. lemon juice (or vinegar)
½ tsp. salt
½ tsp. mustard (dry)
Dash red pepper
1 cup olive oil

Method of Mixture: Mix dry ingredients with yolk of egg thoroughly; add all the acid (use Dover beater). Now add, one teaspoonful at a time, the olive oil; beat continually until the mixture thickens (after 8 teaspoons of oil have been added). Put in oil by tablespoonfuls until all is incorporated. This method shortens the time of making at least one half, and the dressing rarely curdles as it often does in the old methods.

Whipped cream may be added to dressing before serving. Mayonnaise will keep if placed in a cool place, and the above quantities are more easily handled than smaller amounts.

Desserts

Baked Custard

238 calories

1 egg	¾ cup milk
1 tbs. sugar	A few drops of vanilla

Beat egg and sugar together, stir into the milk, grease custard cup with butter, pour in the mixture. Set cup on several layers of paper in a deep pan, surround with hot water (to about half its depth). Set pan in moderate oven and allow to cook slowly until custard is firm in the center. It may be served hot or chilled and turned out, with a tablespoonful of whipped cream on top.

Care must be taken not to allow the oven to get hot, or the egg will coagulate, making a watery, unpalatable, and indigestible mixture.

Caramel Custard

298 calories

Caramel custard is made exactly the same as baked custard, except that the cup is lined with a caramel made as follows: In a small frying pan, place 1 tablespoonful of sugar, place on the stove and stir constantly until it melts and turns a golden brown (do not allow to burn). Fold a cloth about the custard cup and

pour in the caramel, moving the cup about until the sides and bottom are well coated. Pour in the custard mixture and proceed as in baked custard.

Soft Custard

277.8 calories

1 egg (or 2 yolks)
1 tbs. sugar
1 cup milk
A few drops of vanilla

Heat milk in double boiler. Beat egg and sugar together. When milk has reached the scalding point (small bubbles form around the edge of the saucepan), stir in the egg. Care must be taken not to allow the water under the saucepan to become too hot, as the custard will curdle if the egg is cooked at too high a degree of temperature. The custard must be stirred constantly in the beginning until it begins to thicken, then several times a minute until it is of the desired consistency and the raw taste is cooked out of the egg. This mixture is done when it will form a coating upon the spoon. Serve with whipped cream on top (57 calories extra with cream).

Snow Balls

254.7 calories

$\frac{1}{4}$ cup rice
1 cup milk
$\frac{1}{4}$ tsp. salt

Place in a double boiler and cook without stirring until milk is absorbed and rice is tender. Then either pack in egg cups (wet first so that rice will slip out without breaking), or take a square of cheesecloth 8 inches square, dust with flour and place about 4 tablespoons of the cooked rice in center, draw the corners together and tie firmly into a ball. Set the ball in a steamer and steam 1 hour. Remove the cloth gently to prevent breaking the balls. They may be served with custard as a dessert, or as a vegetable with tomato dressing.

Baked Tapioca

2 servings, 513 calories

1 cup milk (scalded)
2 egg yolks
3 tbs. sugar
6 dates
2 tbs. minute tapioca

Beat sugar and egg together, stir in the tapioca and dates, cut into small pieces. (The dates may be omitted, if desired.) Pour mixture into custard cups and bake slowly (as rice custard) until the tapioca is clear and the custard is fairly firm in center.

Orange Tapioca

2 servings, 519.7 calories

½ cup milk
½ cup orange juice
¼ cup sugar
2 tbs. minute tapioca
2 egg yolks
6 drops orange extract

Mix and bake as directed in plain baked tapioca custard. Any other fruit juice may be substituted for the orange, raspberry, pineapple, or grape juice.

Apple Tapioca Pudding

512 calories

1 apple (pared and cored)
1 egg
¾ cup milk
2 tbs. sugar
1½ tbs. tapioca
⅛ tsp. nutmeg

Beat egg and sugar together. Heat milk in double boiler and add egg when milk is scalding hot. Stir in tapioca. Cook 20 minutes. Place apple in cup a little larger than the apple and pour the tapioca custard over the apple. Cover the cup and bake 30 minutes in a moderate oven.

Rice Custard

353.4 calories

1 tbs. raw rice, broiled
1 egg
1 tbs. whipped cream
½ cup milk
1 tbs. sugar
1 doz. raisins if desired
A few drops of vanilla

Beat sugar and egg together. Stir into the milk, stir in the rice and flavor (add raisins if desired — 29 calories). Grease custard cup and fill with the mixture. Bake slowly (in a pan of hot water) until custard is firm in center. Serve with whipped cream.

Orange Rice Custard

2 servings, 399.2 calories

2 oz. orange juice
2 tbs. sugar
½ cup milk
2 egg yolks
½ cup boiled rice (or
¼ cup uncooked)

Beat egg, sugar, and orange juice together. Mix milk with rice and stir the two mixtures together. Bake as directed in plain rice custard.

Tapioca Custard

317 calories

1 cup milk
2 tbs. tapioca (minute tapioca)
1 egg
3 tbs. sugar

Flavor with vanilla or nutmeg, or ¼ square chocolate grated. Scald milk. Boil tapioca in hot water until transparent like jelly, using one cupful of boiling water. (If tapioca does not absorb all of the water, pour off the surplus.) Beat egg and sugar together and add with the milk to the tapioca. Pour into a double boiler, and cook until the raw egg flavor has disappeared. Flavor as desired. 43 calories extra with chocolate.

Foamy Sauce

739 to 746 calories

½ cup powdered sugar
¼ cup butter
½ one egg yolk and 1 whole egg white
1 tbs. sherry wine or
1 tbs. hot milk
¼ tsp. vanilla

Cream butter and sugar (powdered sugar must be used in this recipe). Stir in the well-beaten yolk, add sherry and pour into saucepan over hot water; stir until thick and creamy, lift from hot water and cool as quickly as possible, fold in the stiffly beaten white of egg and serve over pudding at once.

Sauce for Puddings

495 calories with sherry; 549 calories with fruit juice

6 servings; 1 serving, 91.5 calories

1 egg
½ cup powdered sugar
1 wineglass sherry wine or whisky, or
½ glass orange
1 tbs. lemon juice
1 tsp. hot milk

Beat yolk and white of egg separately, add sugar to yolk and beat until creamy, add wine or fruit juice, fold in the egg white and add the hot milk last; serve at once.

Nut Charlotte

496 calories without wine; 510 calories with wine

Two servings

½ cup 40% cream
2 tbs. sugar
8 pecan or walnut meats
¼ tsp. vanilla or
1 tbs. sherry wine

Dissolve sugar in the cream and beat solid, add flavoring or sherry and nuts.

Floating Island

325 calories

1 egg and 1 extra yolk
1 cup milk
1 tbs. sugar
2 lady fingers
Few drops vanilla

Make soft custard, using the two yolks (no white). Chill custard thoroughly. Line individual ice cream cup with the lady fingers; pour the custard over. Beat the white of egg and place on top. Serve at once. The lady fingers may be dipped in sherry wine if desired, using about 2 tablespoonfuls of wine. (26 calories extra.)

Brown Betty

2 servings, 466 calories

2 slices bread
1 large tart apple (or ½ cup blueberries may be substituted for the apple)
2 tbs. sugar
1 tbs. butter
½ tsp. nutmeg or cinnamon

Toast bread and break into small pieces, line the bottom of the individual baking dish with toast bits, cover with a layer of apple or berries, sprinkle with sugar and nutmeg or cinnamon, add butter in bits over this, continue the process until the dish is filled, place bits of butter on top of the last layer of toast and set dish in oven; bake about 20 minutes in a slow oven; serve with whipped cream or hard sauce.

Hard Sauce

228.8 calories

1 tbs. butter
2 tbs. sugar
½ egg white may be added if desired
½ tsp. vanilla, or ½ tsp. nutmeg

Cream butter and sugar together until there are no lumps or grains in mixture. Beat the egg white stiff and fold into the sugar and butter mixture. Flavor.

Orange Charlotte

657 calories

½ cup of orange jelly mixture (see directions for making under jellies), ½ cup double cream, 1 tbs. sugar (the above quantity will require about 2 tsp. of granulated gelatine).

Pour jelly mixture into a bowl and surround with cracked ice; when it begins to stiffen, fold in the stiffly beaten cream.

Pour into molds or ice cream glasses and set aside in the ice-box to become set.

Snow Pudding

428 calories for orange pudding

Orange, lemon, grape juice, or pineapple may be used in preparing this pudding.

½ cup fruit juice	¼ cup sugar
2 tsp. gelatine	1 egg white and
1 tbs. cold water	¼ cup soft custard

Make jelly mixture as already directed and place the bowl in a pan of cracked ice; when the mixture begins to stiffen, fold in the well-beaten egg white (beat it in with an egg beater). Pour the mixture into a mold or individual glasses and set aside on ice to become set. When ready to serve, unmold and pour on the soft cold custard.

Prune or Prune Fig Whip

184.4 or 244.9 calories

6 prunes or 4 prunes and 1 fig — 1 egg white
2 tbs. sugar

Cook the prunes and figs in sufficient water to cover them until they are perfectly soft, press through a sieve, add sugar, chill thoroughly, and fold in the stiffly beaten egg white. The above

mixture may be put in individual cups and baked in a slow oven (in a pan surrounded with hot water) until they are firm in the center and a light brown. Serve with or without whipped cream.

Sponge Pudding

760 calories

2 tbs. sugar
¼ cup flour
2 eggs
2 tbs. butter
1 cup milk
¼ tsp. vanilla

Sift flour and sugar together and make into a thin paste with part of the milk, heat the remainder of the milk and stir in the flour paste. When the mixture is thick and smooth, stir in the butter, then the beaten yolks and last, the whites (well beaten) are folded in. The mixture is now turned into a baking dish and baked (in a pan of hot water as any other custard) until it is firm in the center and well puffed up and brown. Serve with foamy sauce.

Jellies

1 tablespoonful cold water to 3 teaspoonfuls granulated gelatine used in making the following jellies.

Lemon

150.9 calories

½ cup boiling water
2 tbs. sugar (more if desired)
½ lemon, or 2 tbs. juice and
½ rind sliced thin

Orange

253.2 calories

¼ cup boiling water
6 tbs. lemon juice
3 tbs. sugar
2 drops orange extract
½ cup orange juice

Grape Juice

315.4 calories

¼ cup boiling water
½ cup boiling grape juice
1 tbs. lemon juice
3 tbs. sugar

Wine

74 calories

½ cup boiling water
3 tbs. sherry wine
1-inch piece of cinnamon
1 tsp. lemon juice and the yellow rind from ¼ lemon
3 tbs. sugar

Method for Fruit Jellies

Soak gelatine in cold water about 2 or 3 minutes, then pour over it the boiling liquid; add sugar and fruit juice; strain through cloth into wet molds. Set in cold place to stiffen; when firm, unmold. Serve with whipped cream, or pour liquid into baskets made from oranges or grapefruit hollowed out and the edges scalloped, or pour into shallow pans, and cut in ½-inch blocks when firm, and serve on a bed of whipped cream.

Method for Wine Jelly

Put water, wine, lemon juice, peel, cinnamon, and sugar into a saucepan, allow to boil 5 minutes, pour over gelatine (which has been soaked in cold water). If jelly looks cloudy return to saucepan, and add ½ egg white beaten stiff, allow to boil 1 minute, stirring constantly, and strain into mold. Serve with whipped cream.

Water Ices

(Two servings)

Lemon

261.8 calories

2 lemons (juice only)
¼ cup sugar
1 egg white
1 cup water

Orange

377.4 calories

½ cup orange juice
1 lemon
¼ cup sugar
1 cup water
¼ tsp. orange extract
1 egg white

Grape Juice

358.7 calories

½ cup grape juice
1 tbs. lemon juice
¼ cup sugar
1 egg white

Method of Mixture

Mix sugar and water and boil to a rich sirup (about 15 minutes), cool, and add fruit juice (and extract when it is used). Pour into freezer and surround with a mixture of 1 part salt and two parts ice. When sherbet is about half frozen, stir in the stiffly beaten egg white and continue the freezing until mixture is hard. In diseases where it is found inadvisable to give albumen, 1 teaspoonful of gelatine may be substituted.

Apricot

321 calories

½ cup apricot purée
1 cup water
¼ cup sugar
1 tsp. granulated gelatine
1 lemon (juice only)

Make sirup of water and sugar, soak gelatine in a little cold water and add to the hot sirup; press apricots through a sieve and add to the sirup as soon as it is cool; freeze as directed in other ices.

Strawberry

282.8 calories

1 cup fruit juice
⅓ cup sugar

Raspberry

296 calories

Juice of 1 lemon and 1 egg white. Proceed as in other ices.

Currant

604.9 calories

1 cup fresh currants
1 cup water
½ cup sugar
1 tbs. lemon juice

Wash currants carefully and place in a saucepan on a warm but not hot part of the stove, allow to heat gently until the currants are soft, press through a cloth, and add the water and sugar; stir until dissolved (or make a sirup of the water and sugar and add the currant juice and lemon and freeze as directed in other ices). The egg white may be added if desired.

Junket

Plain, Coffee, Egg, Chocolate, or Cocoa Junket

Plain, 210.8 calories

⅔ cup milk
½ junket tablet
¼ tsp. vanilla extract or a grating of nutmeg
1 tbs. sugar

Heat milk to 100° F. Add junket tablet dissolved in 1 tbs. cold water. Mix in sugar and flavoring, and pour into molds to jelly. When junket becomes firm, place in ice until needed.

Ice Creams

Plain Vanilla, Lemon, or Almond Ice Cream

557.4 calories

1 cup thin cream
2 tbs. sugar (more if desired)
½ tsp. vanilla, lemon extract, or almond extract

Method I. Whip cream, add sugar and flavoring, and freeze.

Method II. Scald half the cream and cool. Whip the remaining half, add sugar and flavor and freeze.

Method III. Make "boiled custard," as directed, add one-half the amount of cream and freeze.

To reënforce ice cream, add 1 or 2 egg whites, beaten or unbeaten; these may be added in the beginning, or after the mixture begins to freeze. A tablespoonful of maple sirup, caramel sirup (1 tbs. sugar melted and browned and dissolved in 1 tbs. boiling water), or chocolate sirup may be poured over the ice cream to vary the flavor. Make chocolate sirup by boiling 2 tbs. water, 1 tbs. sugar, and 1 tbs. chocolate to a sirup. 143.3 calories.

Junket Ice Cream

415.8 calories

½ cup each cream and rich milk
1 junket tablet
2 tbs. sugar
½ tsp. vanilla

Heat cream and milk to 100° F. and proceed as in junket. When mixture is jellied turn into freezer, as any ice cream. This is the most wholesome of ice creams and especially suited for children and patients who have tuberculosis complicated with gastric disturbances.

Angel Food Cake

1 small cake, 755 calories

4 egg whites
½ cup sugar
½ cup flour (pastry)
¼ tsp. cream of tartar

Whip eggs until foamy and add cream of tartar, whip until stiff and dry, add sugar gradually, then fold in the flour (the flour must be sifted 4 or 5 times).

Pour batter into an ungreased angel food cake pan and bake in a slow oven for 25 or 30 minutes. Care must be taken not to disturb the cake during the baking, or it will fall.

Sunshine Cake

836 calories

7 egg whites	1 cup sugar
5 egg yolks	½ tsp. cream of tartar
1 cup flour (sifted 3 or 4 times)	¼ tsp. salt

Beat whites of eggs until foamy and add cream of tartar; beat until dry and stiff, add the sugar gradually and fold in the well-beaten yolks. Sift the flour and gradually fold into the rest of the ingredients; pour into ungreased sponge cake pans and bake in a moderate oven for 30 to 40 minutes.



SECTION II

THE HUMAN MACHINE AND ITS RELATION TO FOOD

CHAPTER VI

THE HUMAN BODY

It has been estimated by various writers that the human body has an approximate average chemical composition [1] of —

Oxygen	about	65	per cent
Carbon	about	18	per cent
Hydrogen	about	10	per cent
Nitrogen	about	3	per cent
Calcium	about	2	per cent
Phosphorus	about	1	per cent
Potassium	about	0.35	per cent
Sulphur	about	0.25	per cent
Sodium	about	0.15	per cent
Chlorine	about	0.15	per cent
Magnesium	about	0.05	per cent
Iron	about	0.004	per cent
Iodine, Fluorine, Silicon	very minute quantities		

These chemical elements are combined to make up the various parts of the body just as they are combined to make up the different foodstuffs.

Proteins. — The carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus, and iron are combined and constitute the proteins of the body, as albumins and globulins of the muscular tissues and the blood, as nucleoproteins in the highly nucleated cells of the glandular organs, such as the liver, thymus, and pancreas, etc., as elastin and collagen of the connective tissues, tendons, etc., as ossein of the bones, asphosphoprotein of the brain, as casein and lactalbumen in the milk of all mammals, and as hemoglobin in the red cells of the blood.

Carbohydrates. — Carbon, oxygen, and hydrogen are combined as glycogen and glucose, the former being the form in which the

[1] "Chemistry of Food and Nutrition," by Henry Sherman.

carbohydrates are stored in the liver and tissues for use as fuel in the body, the latter the form in which the carbohydrate circulates in the blood.

Fats. — Carbon, hydrogen, and oxygen are combined to form the fats of the human body as they are to form the fats of food. The human fats occur as adipose tissue, surrounding the various organs, protecting them from shocks and bruises, as phospho-fats and lecithin of the brain, as marrow in the bones, especially in the long bones, and as fat droplets throughout the muscular tissue of the body.

Water. — Constituting more than two-thirds of the body weight, is composed of hydrogen and oxygen, and is distributed throughout the body in every tissue and fluid, entering into and forming an essential part of every active cell.

Mineral Salts or Ash. — The eight remaining chemical elements constitute the mineral salts or ash constituents; these exist in the body and take part in its functions in at least three different ways, according to Sherman,[2] namely: (1) As the constituents which give rigidity and comparative permanence to the skeleton; (2) as essential elements of the protoplasm of the active tissues; (3) as salts held in solution in the fluids of the body, giving to these fluids their characteristic influence upon the elasticity and irritability of muscles and nerves, supplying the material for the acidity or alkalinity of the digestive juices and other secretions, and yet maintaining the neutrality or slight alkalescence of the internal fluids as well as their osmotic pressure and solvent powers.

The Utilization of Food by Body. — When a comparison is made of the chemical composition of food with that of the human body, it is seen that they are practically the same. What is more reasonable than that the body should utilize food which is of like composition, instead of drawing upon its own structure for material to carry on its various functions? From an economical standpoint this is the only wise course to pursue, since a constant use of body material would eventually deplete the entire store. This takes place in cases of starvation and in those diseases wherein

[2] "Chemistry of Food and Nutrition," by Henry Sherman.

the tissues of the body are more quickly broken down than they can be rebuilt.

The Body as an Engine. — A comparison is made of the human body with a steam engine. This comparison is inadequate, since the man-made machine is in constant need of a directing intelligence; alone it cannot turn a wheel, neither can it repair even the smallest break, or the tiniest screw which may become out of order. On the other hand the wheels of the human machine are ever moving; day and night, sleeping or waking, at work or at rest, the work goes on, ceasing only with life itself. As one part becomes worn out, it is discarded, and the part rebuilt with new material. To quote Lusk: "The workshops of life are in a constant state of partial breaking down and materials must be furnished to repair the worn-out parts. In the fuel factor and the repair factor lie the essence of the science of nutrition." [3]

Utilization of Food by the Body. — The utilization of the foodstuffs in the body forms the basis of our study of dietetics. It has been proved that there is a continual breaking-down and building-up process taking place in the living cells. The expenditure of energy involved and liberated as a result of these internal activities leaves the body chiefly in the form of heat, while the end products of the material thus utilized are cast out, leaving by way of the excretory organs, the lungs, the skin, the kidneys, and the intestines.

Metabolism of Body Tissues. — The constant breaking down and building up of the tissues of the body and the evolution of heat as a by-product of the energy expended may be summed up in the term "metabolism." The metabolism of the body is normally supported by the food ingested. However, it is a known fact that were no food eaten the processes would continue just the same, the difference only being the use of the body structure instead of food materials. According to Sherman,[4] the chemical changes and energy transformations are of course inseparable. It has become customary to speak of the metabolism of matter and the metabo-

[3] "The Fundamental Basis of Nutrition," by Graham Lusk.
[4] "Chemistry of Food and Nutrition," by Henry Sherman.

lism of energy, and to regard the extent of the metabolism of any material substance as measured by the amount of its end products eliminated, and the extent of the energy metabolism as measured by the amount of heat or of heat and external muscular work which the body gives off.

Selection of Food by Body. — To understand the changes through which it is necessary for the foods to pass before they become available for use in the body, it is necessary to understand which foods are utilized most economically by the body for the various processes, namely, those which can be used to carry on the internal and external work and those used by the body to repair the worn-out parts and to furnish material for growth. A glance at Table I shows the chemical combinations used for these purposes.

Food as Fuel. — We are fully justified, according to Armsby, "in speaking of the food as body fuel, and in our studies of its utilization we may be confident that any food energy which does not appear in the form of heat or work has not been lost, but has been stored up in the body as the chemical energy of meat, fat, etc., which may later serve to supply food energy to the human body."

Processes of Metabolism. — Under metabolism we may include several processes, namely, **digestion, absorption,** and **assimilation.** Digestion includes all of the changes through which the food in its original form must pass before it can be rebuilt under the influence of the living cells into actual body material. Absorption is really a part of digestion since it involves the passage of the reconstructed compounds through the absorbing walls of the intestinal or digestive tract. Assimilation includes the work of the active cells. The materials originally ingested, having passed through the various digestive processes, are selected by these cells and reconstructed into other substances according to the various needs of the body.

Mechanical and Chemical Digestion. — Taking these processes in order of progression, we begin with the digestion. The preparation of the food materials within the body is the result of both mechanical and chemical agents which act simultaneously through-

out the entire digestional tract. In the mouth, the muscles of the tongue and jaw together with the teeth masticate and mix the food with the fluid from the salivary glands which open into the mouth. Mastication is an entirely voluntary movement which tends to liquefy the food to a certain extent and facilitate its passage into the stomach. After the food is swallowed the movements which occur in the rest of the alimentary tract are involuntary in character and cannot be controlled at will.

Arrangement of Food in the Stomach. — To simplify the study of the gastric organs it may be well to think of the stomach as being divided into three regions, *i.e.*, " the fundus, the middle region, and the pyloric end," [5] each of which differs slightly from the other. After being swallowed, the food enters the region situated at the cardiac end, known as the fundus. This food mass arranges itself in layers; according to Howell [6] " such an arrangement is more readily understood when one recalls that the stomach has never any empty space within — its cavity is only as large as its contents, so that the first portion of food eaten entirely fills it and successive portions find the wall layer occupied and are therefore received into the interior. The ingestion of much liquid must interfere somewhat with this stratification."

Stomach Movements. — The fundus has practically no movements, save the contraction of the walls. As the walls of the fundus become distended by the intake of food, they gently contract upon the mass, forcing the portion which entered first into the " second " or " middle region." In this region the peristaltic waves begin and travel toward the pylorus and increase in force as digestion progresses, ceasing only with the emptying of the organ. When the first stratum of food reaches the middle of the stomach it is caught by these oscillating peristaltic waves and forced forward through the pyloric region and against the pylorus, from whence it is returned back through rings of constriction. This forward and backward movement continues as long as there is food in the stomach.

[5] " Chemistry of Food and Nutrition," by Sherman.
[6] " Textbook of Physiology," by Howell.

Distribution of Secretory Cells. — Secretory cells are distributed in each of the three regions of the stomach, but are more numerous in the middle region than at either end. The third region includes the pyloric vestibule through which all foods must pass before they can enter the small intestine, and terminates in the pylorus, the valve which shuts off the stomach from the duodenum and the rest of the intestinal canal.

Passage of Food from Stomach. — The material prepared in the stomach, known as **chyme**, is passed into the duodenum through the pylorus. The opening of this sphincter is controlled, according to Cannon, to a certain extent by the liquefication of the chyme, but more especially by the presence of free acid in the stomach side of the pyloric orifice.

Behavior of Food in the Intestines. — The food does not pass at once along the canal, but waits in the duodenum until several portions have passed through. As the food mass is made alkaline in the presence of the intestinal juices, the pyloric valve closes, opening again as the contents nearest it on the stomach side are acidified.

Intestinal Movements. — The peristaltic waves in the small intestines begin in the upper part and start a course ever downward. These waves in the intestines are two-fold in character; the quick shallow wave which forces the food string forward, breaking it up into segments, and backward joining the segments together again, and the strong deep wave which carries the entire mass forward after each segmentation. This method of movement in the small intestines is the best one possible under the conditions which prevail in this region of the digestional apparatus, since it not only mixes the food material with the juices necessary for its digestion, but likewise spreads it out over a wide space, insuring a greater contact with the absorbing walls of the small intestines.

Secretory Cells in the Small Intestines. — Situated in the walls in this region are innumerable secretory cells which pour out their secretions upon the food mass as it is tossed back and forth by peristaltic activity. Other cells situated in the pancreatic gland and

liver likewise furnish fluids to assist in the digestion of the foods in the intestinal canal.

Movements in the Large Intestine. — The movements in the large intestine or colon are much like those in other parts of the digestive tract. The small and large intestine are divided by a valve known as the sigmoid flexure, and any food which passes through it cannot return, since the valve is a competent one. The cells in the walls of the larger intestine secrete fluids of a lubricating character, containing no enzymes of digestion but aid in moving the fecal matter toward the rectum.

Chemical Digestion. — The chemical changes in the food materials, after they are eaten, are brought about through the action of certain substances known as soluble ferments or "enzymes." These enzymes exist in every tissue of the body, and their province is first to break down the food materials themselves into simpler compounds, and then to reconstruct the simpler substances into those of a more complex character, which are more available for the various uses of the organism.

Action of the Enzymes. — As Sherman has stated, "all fermentation is brought about either directly or indirectly by the activity of animal or vegetable organisms or cells. When the organisms or cells act directly and the chemical changes occur only in its presence, the fermentation is said to be due to an organized ferment. When the action is not brought about directly by the cell itself, but by means of a substance secreted by the cell but acting apart from it, this substance is called a soluble or unorganized ferment or 'enzyme.'" The enzymes concerned in digestion and metabolism, their source and their action, may be found in the following table:

TABLE XIII[7]

	Enzymes	Where Chiefly Found	Action
Act upon carbohydrates	Ptyalin (salivary amylase)	Salivary secretions	Converts starch to maltose
	Amylopsin (pancreatic amylase)	Pancreatic juice	Converts starch to maltose
	Liver diastase	Liver	Converts glycogen to glucose
	Muscle diastase	Muscles	Converts glycogen to glucose
	Invertase (sucrase)	Intestinal juice	Converts glycogen to glucose and fructose
	Maltase	Intestinal juice	Converts maltose to glucose
	Lactase	Intestinal juice	Converts lactose to glucose and galactose
	Glycolytic enzymes	Muscles, etc.	Split and oxidize glucose
Acts on fats	Lipase (steapsin)	Gastric, and pancreatic secretions, blood and tissues	Splits fats to fatty acids and glycerin
Act on proteins	Pepsin	Gastric juice	Splits proteins to proteoses and peptones
	Trypsin	Pancreatic juice	Splits proteins to proteoses, peptones, polypeptoids and amino acids
	Erepsin	Intestinal juice	Splits peptones to amino acids and ammonia
	Autolytic enzymes	Tissue generally	Split body proteins to simpler substances
Act on purins	Guanase	Thymus, adrenals, pancreas	Changes guanin to xanthin
	Adenase	Spleen, pancreas, liver	Changes adenin to hypoxanthin
	Oxidases	Lungs, liver, muscles, etc.	Cause oxidation of hypoxanthin to xanthin and xanthin to uric acid

[7] Compiled from "Textbook of Physiology," by Howell, and "Chemistry of Food and Nutrition," by Sherman.

Classification of Enzymes. — Sherman classifies the enzymes of the body according to their effects:

1. The hydrolytic enzymes:
   (*a*) Proteolytic or protein-splitting enzymes.
   (*b*) Lipolytic or fat-splitting enzymes.
   (*c*) Amylolytic or starch-splitting enzymes.
   (*d*) Sugar-splitting enzymes.
2. The coagulating enzymes, such as thrombin or thrombase (the fibrin ferment) and rennin, which causes the clotting of milk.
3. The oxidizing enzymes or oxidases (which, if the oxidation be accompanied by a splitting off of amino groups, may be called "deaminizing" enzymes).
4. The reducing enzymes or "reductases."
5. Those which produce carbon dioxide without the use of free "deamidizing" oxygen, such as zymase of yeast.
6. Enzymes causing the breaking down of a larger into a smaller molecule of the same composition, as in the production of lactic acid from glucose.

Digestion (Chemical)

Salivary Digestion. — The table shows that enzymic action begins in the mouth. **Saliva**, the characteristic secretion of this region, contains the enzyme ptyalin which exerts its influence upon the starches and dextrins. The food mass remains in the mouth for so short a time, however, that a very small percentage of the starch is changed to maltose under salivary digestion. The action of ptyalin, however, continues in the fundus of the stomach until stopped by the acid in the gastric juice.

Gastric Digestion. — The conditions existing in this region of the gastric organ of digestion are particularly favorable to the continuance of salivary digestion on account of the neutral character of the juices secreted by the cells there, and because there is so little movement taking place. The cells in the middle region, however, secrete a fluid rich in acid, and as the food mass is gradually pushed forward by the contraction of the stomach walls into

this portion of the stomach, further conversion of starch and dextrin to maltose is checked. Gastric juice is secreted by cells situated in all parts of the stomach. The character of the secretions differs in different parts of the organ. However, that in the fundus is neutral in character or even slightly alkaline, according to Howell, while that in the middle region is highly acid. The pyloric end of the stomach exhibits strong peptonizing powers and much of the hydrolysis of protein takes place here. As the food is pushed out of the fundus it is caught by the waves of peristaltic action and swept toward the pylorus. This movement of the food mass to and from the pylorus under the influence of the muscular constriction in the stomach tends to mix it thoroughly with the juices in all parts of the stomach, and in a measure to liquefy it to the " souplike " mixture known as chyme.

Composition of the Gastric Juice. — The active characteristics of the gastric juice are centered in the secretion of hydrochloric acid and the proteolytic enzyme " pepsin." The latter acts only in an acid medium, consequently the food must first come in contact and be saturated with the hydrochloric acid before the proteins can be acted upon and hydrolyzed to proteosis by the enzymes in the pyloric end of the stomach. The second proteolytic enzyme in the gastric juice is rennin. This has the property of clotting sweet milk. The third enzyme of the gastric secretion is a fat-splitting lipase which acts, however, only upon the finely divided fats or emulsions such as cream, milk, and egg yolk.

The opening of the pyloric valve does not occur with every wave of peristalsis. Science has proved that the relaxation of this valve occurs only in the presence of free hydrochloric acid. A small portion is injected into the duodenum at each opening and remains there until neutralized by the alkaline salts in the intestinal juices.

The Effect of Muscular Constrictions. — The muscular constrictions occurring in the intestines producing segmentation of the food string have, according to Sherman, the effect of " (1) further mixing of the food and digestive juices, (2) bringing the digested food into contact with the absorbing membrane, (3) empty-

ing the venous and lymphatic radicles in the membrane, the material which they have absorbed being forced into the veins and lymph vessels by the compression of the intestinal walls." [8]

Stimulation of Intestinal Secretions. — The flow of the intestinal juices is stimulated by a substance or *hormone* known as "**secretin.**" This hormone is the result of the action of hydrochloric acid upon some substance in the intestinal wall. Starling [9] claims that the formation of hormones and their circulation through the blood to the reactive tissues is sufficient to account for the activity of the pancreas; he doubts if the nervous system plays any part in the activity of that organ.

Intestinal Digestion. — Digestion proceeds in an orderly manner throughout the intestinal canal. The pancreatic juice, bile, and intestinal juice are poured upon the food mass on its entrance into the duodenum. The enzymes work simultaneously. *Trypsin* in the pancreatic juice takes up the hydrolysis of the proteoses and peptones and those proteins which have escaped gastric digestion. The *amylopsin* likewise in the pancreatic secretion acts upon the starch and dextrin, changing them to maltose. The lipases split the fats to fatty acids and glycerol.

The *erepsin* in the intestinal juice, "succus entericus," brings about further change in the proteins, with the production of amino acids. The bulk of the carbohydrates are converted into monosaccharides in the smaller intestines. The lactose, maltose, and sucrose are changed through the activity of the lactase, maltase, and invertase into glucose. Sherman states that "it is possible that the splitting of the lactose (milk sugar) may occur in the intestinal wall rather than in the food mass." [10]

Bile. — Human bile, the secretion most actively concerned in the digestion and absorption of the fats, contains water, bile salts, bile acids, bile pigments, cholesterin, lecithin, and a peculiar protein derived from the mucous membranes of the bile ducts and gall bladder.

[8] "Chemistry of Food and Nutrition," by Henry Sherman.
[9] "Recent Advances in the Physiology of Digestion," by Starling.
[10] "Chemistry of Food and Nutrition," by Henry Sherman.

Action of Bile upon Fat. — The fats, as has already been stated, have been split through the activity of the lipases into fatty acids and glycerol. The glycerol is readily soluble in water, while the bile quickly dissolves the fatty acids. Bile likewise diminishes the surface tension between oily and watery fluids and for this reason augments the digestion of the proteins and carbohydrates as well as the fats. The bile acids are absorbed to a large extent and re-secreted by the liver. According to Starling "bile must also be considered as an excretion, representing as it does the channel by which the products of disintegration of hemoglobin, red coloring matter of the blood, are gotten rid of by the organism." Investigation has proved that while the secretion of bile by the liver is continuous, its injection into the intestines occurs only during the process of digestion.

Digestion in the Larger Intestine. — Science has proved that most of the nourishing part of the food ingested is digested and absorbed before it reaches the larger intestine. The two portions of the alimentary canal known as the small and large intestine are separated by the ileocecal valve. Cannon claims "that this valve is competent, that is, under normal conditions the food mass which passes through into the colon cannot be forced back into the small intestine." The food mass sometimes contains materials which have escaped digestion, likewise some of the active enzymes which bring about their hydrolysis, in which case a certain amount of their digestion may continue in the large intestine.

So far, investigators have found no enzymes in the fluids secreted by the cells in the walls of the large intestine, but they have found an alkaline fluid which assists in completing the digestion of the foods which has started in other parts of the intestinal tract.

Absorption. — Absorption of food occurs in all parts of the intestinal canal, but the major portion of it occurs in the small intestines, the mucous membrane lining of which seems particularly adapted for this purpose. According to Taylor there is no absorption of fats, carbohydrates, or proteins in the stomach. Other investigators believe that some of the protein is absorbed and also some glucose in concentrated solution. However, the stomach

cannot be considered of great value as an absorbing organ. Physiology teaches that the absorption of the products of digestion occurs by means of the millions of small projections or villi with which the intestinal wall is lined. These villi contain numerous capillary blood vessels and spaces known as lacteals. The former converge into the portal vein, the latter into the lymphatic vessels and thence into the thoracic ducts.

The Absorption of Fat. — The fats, as has been described, are split into their two constituents, fatty acid and glycerol. The former is dissolved by the bile to form soap; the latter is readily soluble in water. These constituents thus dissolved pass through the walls and recombine in the form of neutral fat droplets, probably during the passage through the walls, since they appear in this form in the cells. They pass into the thoracic duct and thence into the blood stream.

Absorption of Carbohydrates. — The carbohydrates are chiefly absorbed in the form of monosaccharides. This has been proved by introducing cane sugar or lactose into the blood vessels and getting the greater portion of it back unchanged by way of the urine. As the monosaccharides are taken up by the capillaries lining the walls of the small intestines, they are passed on to the portal vein and carried by the portal blood into the liver, where they are stored temporarily as glycogen, and given out to the blood in the form of glucose as needed. After a meal rich in carbohydrates, the portal blood will be rich in glucose, while the blood in general circulation contains about the same amount as usual, about 0.1 per cent.

Absorption of Proteins. — The absorption of the products of protein digestion occurs through the capillary blood vessels and passes on to the portal vein. The metabolism of protein is more complex than of that of any of the foodstuffs. It is probable that each living cell contains enzymes which are capable of breaking down the body proteins with the production of amino acids just as the proteins of the food are broken down by enzymes of digestion, and according to Sherman "it is not improbable that protein synthesis also may be brought about by every living cell."

The Absorption of Water. — Does not occur in the stomach, as was formerly believed, but in the small intestines.

The Absorption of the Mineral Salts. — Occurs in conjunction with the other food material. Some of the mineral salts are much more soluble than others and are more readily absorbed. The function of the mineral salts in the body has already been described, and since they form a part of every tissue and fluid in the body their absorption and fate in metabolism must be studied with that of the other chemical combinations.

ABSORPTION IN THE LARGE INTESTINES

The digestion of the food as it is passed into the last portion of the alimentary canal has been largely completed. However, that part which has escaped digestion in the small intestine is finished and absorbed here. The important peristaltic waves occurring in this region are antiperistaltic in character and have the property of churning the food thoroughly and bringing a larger portion of it in contact with the absorbing walls. The water which is left in the food mass together with the products of the digestion of the foodstuffs is absorbed in the first part of the large intestine, leaving the remainder more solid. This residue is known as feces or fecal matter.

Factors Influencing Digestion. — There are various factors which play a part or have an influence upon the digestion of food in the body. Those involved in good salivary digestion are mechanical, chemical, and psychical, the teeth and tongue grinding and mixing the food with the saliva. The foods requiring chewing stimulate a flow of salivary acids, and excite a flow of saliva, but tend to check the action of the salivary amylase, ptyalin. The sight, smell, and taste all act together, stimulating the flow of saliva, thus increasing digestion in the mouth.

Factors Influencing Gastric Digestion. — The factors influencing digestion in the stomach constitute all those mechanical, electrical, chemical, and psychical factors which stimulate or retard the action of the gastric juices. The movements in the stomach are invol-

untary, but their activities may be stimulated by the flow of gastric juice. Sleep retards digestion in the stomach by retarding the movements in the organ itself.

Stimuli to Gastric Flow. — The division and liquefaction of the food in the mouth hastens gastric digestion by making the food better fitted for the action of the enzymes in the gastric juice. The type as well as the character of the food acts as a stimulus to the gastric secretion.

Water is probably the best of all the agents for stimulating the secretion of gastric juice, while **dextrin** (toast, zwiebach) and the **extractives of meat** likewise exert similar powers.

Retarding the Gastric Flow. — The nervous system, on the other hand, at times checks or entirely inhibits a flow of these juices. Worry, excitement, anger, fatigue, chill, each plays its part in promoting poor digestion in the gastric organ. As chemical factors, water and salts are the two necessary substances for gastric digestion, since the enzymes in the juices cannot act except in their presence.

Alkaline carbonates and **fatty foods** both check the flow of gastric juice, and retard digestion. The psychic factors which result in a stimulation of the secretory cells in the stomach are exerted through the sight, smell, and taste. One often hears the expression: "The food looked, smelled, or tasted so good that it made my mouth water." This actually occurs; hence the secretion has been named appetite juice. This appetite juice acts as a direct stimulant to the cells in the mucous lining of the stomach, causing a flow of gastric juice. It cannot be said to cause digestion, but it certainly institutes that process, thus starting the whole digestional procedure.

Factors Influencing Rate of Food Passage. — As has already been stated, the passage of food from the stomach is dependent upon the free acids, organic or hydrochloric, in the stomach, and the type of food determines in a measure the rate with which the organ is emptied. Numerous investigators have proved that certain foods leave the stomach before others. This is chiefly dependent upon the amount of acid required by them for saturation.

Rate of Carbohydrates, Proteins, and Fats. — Carbohydrates, for example, do not require any acid for their digestion, hence all of the acid with which they come in contact can go toward acidifying them, while the proteins require hydrochloric acid before the enzymes can begin to exert their activities. Consequently they leave the stomach much more slowly than the carbohydrates. The fats leave more slowly than any of the other food combinations. If carbohydrates and proteins are taken together they leave the stomach more slowly than if the carbohydrates were fed alone, but more quickly than they would if the meal consisted of protein alone. When the meal consists of fats and proteins, the stomach is emptied more slowly than is the case when either is fed alone.

Taylor and other investigators hold that "the function of the pancreas and of the secretory activity of the small intestine are dependent upon the secretions and motor processes of the stomach." However, it is an established fact that at least three-quarters of the work of digestion is accomplished in this part of the alimentary canal, and in certain pathological conditions in which the gastric organ is so badly diseased as to require partial removal, the entire work of the digestion of the food may be carried on and completed in the small intestine.

There is no doubt as to the desirability of good salivary and gastric digestion, since it would be unwise to force one part of the organism to work at the expense of another. Physiologists have proved that the activity of the pancreas and other secretory organs are stimulated by hydrochloric acid secreted by the cells situated in the mucous lining of the stomach walls. Hence any stimulation of these cells by water, extractives, etc., results in an increased flow of hydrochloric acid, and a consequent stimulation of the above-mentioned secretory organs. Thus, one organ assists the other, and the whole process proceeds to a harmonious completion.

Bacterial Action in the Alimentary Canal. — The changes in the foods so far mentioned have been chiefly the result of the activity of the enzymes existing in the various digestive processes throughout the body. But there are other changes which occur

in the foods during their sojourn in the digestive tract which are not accountable to enzymic action, but which, in fact, modify to a certain degree the changes wrought by the enzymes. These are the result of the activity of certain specific bacteria which inhabit the entire digestive tract of the individual from a few hours after birth until death. Some of these have so adapted themselves to the existing conditions that, unless present in overwhelming numbers, they are not only harmless, but they actually assist in protecting the organism from the inroads of more harmful species. Many experiments have been made to find whether or not bacteria are essential to human nutrition, and the results of these experiments prove that they are not. However, since they are so firmly established in the body it is well to study the various types and learn as much as possible of the products of their activity and the influence which they exert in human nutrition.

Type of Bacteria. — It would be impossible and unnecessary to consider the action of all of the bacteria in the body in this text, but it is necessary to consider those which are prominent in bringing about decomposition of the foods in the digestive tract. Sherman holds that there are three main types having this property: "(1) the bacteria of fermentation, such, for example, as the lactic acid bacteria; (2) the putrefactive bacteria, such as the anaërobic B. aërogenes capsulatus; (3) bacteria of the B. coli type, showing the character of both the fermentative and putrefactive organisms, but tending in general to antagonize the putrefactive anaërobes."[11]

Fermentation in the Stomach. — In the stomach, fermentation of the carbohydrates with the production of organic acids, and at times alcohol, occurs. The types of fermentation taking place in the stomach are alcoholic, lactic, butyric, acetic, formic, oxalic, and cellulose. The bacteria inhabiting the gastric organs are dependent upon air for existence, while those in the intestines are not.

Factors Influencing Excessive Fermentation. — The factors influencing excessive fermentation in the stomach are lack of "tone" and motility in the organ, insufficient amount or absence of free hydrochloric acid in the gastric secretion, dilation of the

[11] "Chemistry of Food and Nutrition," Sherman.

stomach, and an excess of carbohydrate foods in the diet. Of the latter, sucrose and glucose are especially susceptible to the action of fermentative bacteria. Under normal conditions, that is, in health, the conditions prevailing in the stomach are very unfavorable to the development of bacteria of the putrefactive type, the gastric juice exhibiting decided germicidal properties. Then, too, the presence of air acts against their development. Much of the so-called gastric fermentation does not occur in the stomach but rather in the duodenum.

Bacterial Action in the Intestines. — In the lower part of the small and in the large intestines, the bacteria of the anaërobic type increase, conditions more favorable to their development existing there than farther up in the intestinal tract. However, there are a great many bacteria in the whole of the small intestine. Those producing decomposition of the unabsorbed proteins are especially prominent in the colon.

Herter [12] states that "the presence in the colon of immense numbers of obligate micro-organisms of the B. coli type may be an important defense of the organism in the sense that they hinder the development of that putrefactive decomposition which, if prolonged, is so injurious to the organism as a whole. We have in this adaptation the most rational explanation of the meaning of the myriads of colon bacilli that inhabit the large intestine. This view is not inconsistent with the conception that under some conditions the colon bacilli multiply to such an extent as to prove harmful through the part they take in promoting fermentation and putrefaction."

Effect of Bacterial Activity in the Body. — In summarizing the effects of bacterial action in the body it is found that with the exception of oxalic acid, which is exceedingly injurious, and which, according to Herter, results from the eating of large quantities of meat and sugar, the products of fermentation are simply irritating in character, while those resulting from putrefaction are distinctly toxic. Among the substances deserving mention under this head we have indol, skatole, cresol, and phenol. These substances are

[12] Herter's "Bacterial Infections of the Digestive Tract" (1907).

very soluble and upon absorption combine with the sulphuric acid formed in the body and are excreted by way of the kidneys where they appear in the urine as "conjugated sulphates," the chief of which is indican. The amount of indican in the urine is taken as a measure of the intensity of the putrefaction taking place in the body.

METABOLISM

After the food has passed through the process of digestion, has been hydrolyzed to the simpler substances required and as such has been absorbed, the next step in its progress is the rebuilding into body material, which process is known as metabolism, or the building of lower substances into higher ones.

Behavior of Carbohydrates in Metabolism. — As Sherman[13] has said: "At least two kinds of enzymes are believed to be involved in the combustion of glucose in the tissue cells, (1) clearage enzymes, which split the molecule into fragments more easily oxidized, and (2) oxidizing enzymes or oxidases which stimulate the oxidation of the cleavage products. Both kinds of enzymes are widely distributed through the body and are believed to be normal constituents of all active cells."

Production of Energy. — It has been proved that the energy for external and internal work is produced largely from the glucose brought by the blood and oxidized in the muscles, the activity of the cells in the tissues, rather than the amount of oxygen, determining the rate of combustion. When a surplus amount of carbohydrate food is eaten, instead of being burned it is stored in the liver and muscles as glycogen. Calorimeter experiments have proved that when the supply of carbohydrates is greatly in excess, the body will utilize them for the production of energy in place of the fats in the diet.

Fate of the Carbohydrates. — After their oxidation the end products of carbohydrates, that is, the substances which are no longer available for use in the body, leave it in the form of carbon dioxide and water by way of the kidneys (urine), the skin, the lungs, and the intestines.

[13] "Chemistry of Food and Nutrition," Henry Sherman.

Fate of the Fats. — The fats upon absorption are taken up by the lymph vessels instead of the capillaries and enter the blood with the lymph. According to various investigators, the fat which causes the turbidity of the blood plasma at the height of absorption will, as a rule, disappear after a few hours, part of it being burned as fuel, producing energy for the internal and external work of the body, and at least a part of the fats eaten being rebuilt into body fat. The end-products of fat metabolism, like those of the carbohydrates, consist of carbon dioxide and water, and leave the body by the same excretory channels.

Protein metabolism is certainly more complex than that of either of the other active organic food groups. The amino acids which are the products of protein digestion are taken up by the capillary blood vessels in the intestinal walls and are passed by them into the portal vein, soon to become available for the needs of the body.

Metabolism of Body Tissues. — There are certain autolytic enzymes which are found in all the organs. These enzymes break down the proteins of the tissues and fluids of the body with the production of amino acids, which are seemingly exactly like those formed in digestion. A small part of the products of protein metabolism is used as repair material and for the building up and strengthening of the muscular tissues, but the greater part is utilized by the body as fuel for the production of energy.

End Products of Protein Metabolism. — After utilization in the body, the proteins, like the other foods, leave certain waste products which indicate to a greater or lesser extent the completeness with which the organism has made use of the food materials. The end-products of protein metabolism are: **urea**, **ammonium salts**, **purin bodies**, and **creatinin**. These products leave the body chiefly in the urine. The chief end-product in man is urea. This substance represents from 82–88 per cent of the total nitrogen excreted by the kidneys. However, the less highly oxidized products represent the incomplete products of protein metabolism and thus indicate the changes through which these products must pass before being changed into urea. If for any reason there is an

impairment of the liver through which they must pass and where the change into urea is accomplished, there will be a rise of ammonia and a corresponding decrease in the output of urea in the urine. Thus, ammonia is formed at the expense of the urea. This occurs in fevers, diabetes, and certain structural diseases of the liver. According to Sherman: [14] "Normally about 2 to 6 per cent of the total nitrogen eliminated is in the form of ammonium salts, the amount depending largely upon the relation between the acid-forming and base-forming elements in the food."

Purin Bases. — These compounds are formed in the body as cleavage products of nucleoproteins or taken into the body in food. The chief of these products are **adenin**, **guanin**, **hypoxanthin**, **xanthin**, and **uric acid**. The latter is the most highly oxidized of all the purin bases and the form which is chiefly eliminated in the urine.

Formation of Uric Acid. — The formation of uric acid can in a measure be controlled by attention to the diet, eliminating those foods known to be purin bearing. Normally from 1 to 3 per cent of the nitrogen eliminated will be in the form of uric acid. The normal human being oxidizes about half of the purins eaten and excretes about half, mainly in the form of uric acid. According to Mendel, the formation of uric acid takes place throughout the body, and its partial destruction is accomplished by the kidneys, muscles, and liver. The formation of purins in the body and their elimination in the form of uric acid is especially significant in certain pathological conditions, gout, for example, in which the body has difficulty in eliminating these compounds.

The purin bodies are both endogenous and exogenous — that is, they may be brought into the body in food as such, or they may be formed as a result of the metabolism of the body tissues. For this reason the damage wrought by these substances may to a certain extent be controlled by eliminating the purin-bearing foods from the diet. Flesh-foods are high in purins, especially the highly nucleated glandular organs, liver, thymus (sweetbreads), etc., kidney, beef, mutton, veal, pork, chicken, turkey, goose, sardines,

[14] "Chemistry of Food and Nutrition," Sherman.

anchovies, all kinds of fish, except cod. Among the vegetable foods asparagus, beans, peas, and spinach are highest in purins. Boiling extracts much of the purins from food. Meat especially should be prepared by this method, if used in the diet of individuals suffering from gout. Eggs and milk are purin free, and may be used freely. Certain substances increase the difficulty of eliminating uric acid. Alcoholic beverages for example are especially deleterious.

Creatinin. — This end-product of protein metabolism is, like uric acid, endogenous and exogenous. It is one of the normal constituents of the urine. The quantity is fairly constant for the individual, averaging about 0.02 gram per kilogram of body weight per day.

SUMMARY

Behavior of Food in Metabolism. — We have seen in this brief history of the behavior of the foodstuffs in metabolism just why it is not possible for a human being to exist upon one kind of food alone. The mystery surrounding the transformations of the foods in the body has received much light during the past few years.

End-products of Protein Metabolism. — Take, for example, the end-products of protein metabolism. Formerly it was believed that uric acid was the result of the metabolism of all simple proteins; now we know it to be the end-product of a group of food substances known as purins, which are combinations of a simple protein with a nuclein or nucleic acid, and since these substances are particularly abundant in the glandular organs, such as liver and sweetbreads, and in meat, the question of the production of uric acid in the body resolves itself into a nutritional problem.

Controlling the Uric Acid Output. — By reducing the purin-bearing foods in the dietary one can control to a large extent the output of uric acid in the urine. **Ammonia**, another end-product of protein metabolism, is looked upon as an index to the amount of excess acid produced in the body.

Acid-forming and Base-forming Foods. — Mendel [15] states: "There are foods which act as potential acids and others which function as bases in the organism. When burned up either in the laboratory or in the body cells, they have a preponderance of acid or base, as the case may be, in their ash. In this respect potatoes, apples, raisins, and cantaloupes, for example, are base-forming foods which depress the output of ammonia and increase the solubility of uric acid in the urine, whereas meal, cereals, and prunes (the latter with their content of benzoic acid) furnish acids in predominance. Milk is intermediate in this respect."

Thus it is demonstrated of what inestimable value is Nature's donation of food to mankind and also of the wonderful way in which the human organism makes use of these gifts.

Use of Food Combinations by Body. — One chemical combination is used as building stones to repair the old and construct the new tissues necessary for life's continuance; others are utilized as fuel, not only to maintain a normal temperature in the body and prevent us from freezing to death, but also to drive the engine which turns all the wheels of the internal mechanism; while still others are used as regulators of the body processes lending alkalinity to one secretion and acidity to another; increasing the solubility and diffusibility of certain substances, thereby assisting their passage through the walls of the cells. "As soluble salts held in solution in the fluids of the body, giving them their characteristic influence upon the elasticity and irritability of muscle and nerve." [16]

The Process of Osmosis in the Body. — The influence exerted upon the process of osmosis in the body is one of the most important parts played by the mineral salts in metabolism. The fact that these chemical substances are indispensable to the metabolic processes makes it necessary for the nurse to know where they can be found in food and how to best

[15] "Newer Points of View Regarding the Part Played by Different Foodstuffs in Nutrition," by Lafayette Mendel, Ph.D. Read at the Sixty-fifth Annual Meeting of the American Medical Association, June, 1914.

[16] "Chemistry of Food and Nutrition," Sherman.

utilize them in the abnormal conditions which from time to time develop.

Factors Affecting Metabolism. — The various factors affecting the metabolism of the human body, the age, and activity of the individual, his health and nervous organization, have been dealt with in the foregoing pages. The behavior of the body under abnormal conditions must be discussed in the chapters dealing with the different nutritional disorders.

CHAPTER VII

THE FOOD REQUIREMENTS OF THE BODY

THE human body, as far as can be judged, does not use one nutrient to the exclusion of another, but science has proved that the best results are obtained from diets balanced to suit the needs of the body, providing the fuel and repair materials in the amounts which are calculated to give the maximum value with the minimum expenditure on the part of the organism. The investigators have endeavored to standardize the food requirements of the body. In America these standards are higher than in most of the other countries; for example, in France Gautier recommends the following standards for men with little muscular work:

Protein	107 grams
Fat	65 grams
Carbohydrates	407 grams

which will provide 2640 calories per day.

In England Playfair recommends the following standard for men of moderate activity:

Protein	119 grams
Fat	51 grams
Carbohydrates	531 grams

In Germany the standard suggested by Voit is low in fat and high in carbohydrates. This was probably so arranged because the carbohydrates were cheaper than the fats. Voit's standard for men at moderate muscular work:

Protein	118 grams
Fat	56 grams
Carbohydrates	500 grams

Atwater's standards for American dietaries are more liberal than any of the others. He has suggested "that the standard

must vary not only with the conditions of activity and environment, but also with the nutritive plane at which the body is maintained." "A man may live and work and maintain bodily equilibrium on either a higher or a lower nitrogen level, or energy level. One essential question is, what level is most advantageous? The answer to this must be sought not simply in metabolism experiments and dietary studies, but also in broader observations regarding bodily and mental efficiency and general health, strength, and welfare." [1]

TABLE XIV

ATWATER'S STANDARD FOR MEN AND WOMEN WITH VARYING MUSCULAR ACTIVITIES [2]

	Protein Grams	*Fuel Value Calories*
Man with hard muscular work	150	4150
Man with moderately active muscular work .	125	3400
Man at sedentary or woman with moderately active work	100	2700
Man without muscular exercise or woman with light to moderate work	90	2450

FACTORS DETERMINING THE FOOD REQUIREMENTS OF MAN

There are a number of factors exerting more or less influence upon the food requirements of the body, namely: age, sex, height, size of the body, muscular activity, etc. Of these factors, the age and muscular activities probably play the most important parts. From birth to the twenty-fifth year the factor of growth is of paramount importance. During this period the organs of the body must be furnished material for growth and development and the body itself with material for its increase in weight and height. When the supply of food is not commensurate with the rate of

[1] "Chemistry of Food and Nutrition," by Sherman.

[2] Farmers' Bulletin, No. 142, U. S. Department of Agriculture. "The Demands of the Body for Nourishment and Dietary Standards," Fifteenth Report, Storrs (Conn.) Agricultural Station.

metabolism, growth and development cease and sooner or later evidences of disturbed nutritional and metabolic processes become apparent.

Daily Gain. — In estimating the relative daily gain in body weight of children of different ages, Mendel [3] gives the following table:

TABLE XV

In the first month, about	1.00 per cent
At the middle of the first year	0.30 per cent
At the end of the first year	0.15 per cent
At fifth year	0.03 per cent
Maximum in later years for boys	0.07 per cent
Maximum in later years for girls	0.04 per cent

Use of Chemical Combinations. — Thus it is seen that the period during which the growth is most rapid is during the earlier months of life. "The growing body requires protein with which to build body tissues, muscles, etc., while carbohydrates and fats are used as fuel. It is obvious, therefore, that more protein or nitrogen must be ingested than excreted in order that the needs of the growing tissues may be supplied. The skeleton, teeth, etc., in the same way require mineral salts for their growth, and more salts must be ingested in the food than are lost in the excreta. These salts which are retained in the body are used to build up the new bone.

Retention of Nitrogen in Infancy. — When the baby is gaining in weight and strength there is a retention of both nitrogen and salts, and when the baby is not gaining there may be a loss of both of these bodies; when one is retained in the body the other is apt to be retained." [4] After the body has reached maturity, that is, after the stature has reached its full height and development, there still remains the maintenance factor. There is never a period of life during which repair foods are not necessary. The broken-down tissues, due to the wear and tear of intracellular work, must be replaced with new material in order that the work may go on without permanently injuring the health of the individual. These

[3] "Childhood and Growth," p. 18, by Lafayette Mendel.
[4] "Diseases of Nutrition and Infant Feeding," by Morse and Talbot.

repair foods, as shown in the beginning of this text, consist of proteins.

Age. — Children have a greater food requirement in proportion to their weight than adults. This is not only in proportion to their weight but to their surface area. According to Sherman [5] "the total metabolism of a two-year-old child at rest, weighing twenty-five pounds, is half as great as that of an adult weighing six times as much. Hence the food requirement per unit of weight is three times as great for the child as for the man at rest."

Sex. — Women's weight averages about 0.8 as much as a man's, consequently if she is equally as active her food requirement may be computed as .8 of his.

Langworthy [6] estimates the average food requirements for persons of moderate activity as 3000 calories per day — 100 grams or 400 calories of which must be obtained from protein to provide for the nitrogen requirements of the body. Dr. Langworthy suggests that for men, such as mechanics, who have greater muscular activity and perform moderately active labor, the standard of food requirements be raised, for example:

For food purchased 115 grams of protein and 3800 Energy Calories.

For food eaten 105 grams protein and 3500 Energy Calories.

Dr. Sherman [7] suggests making use of the following factors in computing the food requirements for the different ages, namely: The factor 1 for man and 0.8 for women and boys between the ages of 14 and 17 years. For girls of like ages the factor .7. For children from 10 to 13 years he suggests .6 as a factor, for those between the ages of 6 and 9, .5, and for those from 2 to 5 years, .4. For all children under 2 years, the factor .3. These factors are based upon the requirements of men engaged in moderately active work. According to Sherman a woman of weight and activity equal to man would require as much food to cover her energy re-

[5] "Chemistry of Food and Nutrition," by Henry Sherman.

[6] "Food and Diet in United States." Reprinted from the "Year Book of the U. S. Department of Agriculture for 1907."

[7] "Chemistry of Food and Nutrition," by Henry Sherman.

quirements as he. The requirements of either must necessarily vary with the degree of activity.

The following tables, selected from estimates made by Atwater and Benedict, Von Noorden, and Sherman, are given to show the variations in the food requirements of the different ages according to the degree of activity:

TABLE XVI

I[8]

Man sleeping	65 calories per hour
Man sitting at rest	100 calories per hour
Man at light muscular activity	170 calories per hour
Man at active muscular activity	290 calories per hour
Man at severe muscular activity	450 calories per hour
Man at very severe muscular activity	600 calories per hour

II[9]

Men and women of young to middle age at complete rest	30–35 calories per kilo. per day
Men and women of young to middle age at light exercise	35–40 calories per kilo. per day
Men and women of young to middle age at moderate exercise	40–50 calories per kilo. per day
Men and women of young to middle age at hard muscular exercise	45–60 calories per kilo. per day

III[10]

Boys 14–17 years will require	2500–3000 calories per day
Girls 14–17 years will require	2200–2600 calories per day
Children of 10–13 years will require	1800–2200 calories per day
Children of 6–9 years will require	1400–2000 calories per day
Children of 2–5 years will require	1200–1500 calories per day
Children of 1–2 years will require	900–1200 calories per day

Exercise. — All of the investigators agree that exercise is the most potent factor affecting the food requirements of man, except during that period in which the body must grow and develop. In infancy the rapid rate of metabolism necessitates a larger proportion of food in proportion to weight than in later years. But even in childhood exercise exerts a most telling influence upon the

[8] Atwater and Benedict's estimates. [9] Von Noorden's estimates.
[10] Sherman's estimates.

amount of food necessary to keep the body in good running order; for instance, little boys generally exhibit a greater muscular activity than little girls and even in the cases where the age and weight of the children are identical the muscular tension of the boys is generally found to be greater than that of the girls. Exercise does not break down a muscle as some imagine, but builds it up both in size and in strength. In this way the protein is stored in the body as such.

After fifty the muscular activity as a rule decreases: the desire for heavy exercise becomes perceptibly less. In many cases the diet habits acquired when the amount of exercise was greater continue to exist, consequently when the amount of food eaten is greater than the expenditures of the body there will often be an accumulation of fat which increases the body weight of the individual. A reasonable increase in the adipose tissues is not objectionable, but when the organism shows evidences of nutritional disturbances due to the over-supply of food and a lack of muscular activity, the diet should be immediately adjusted to more adequately meet the changed conditions.

Transformation of Food in the Body. — It has been proved that as far as Nature is concerned there is no difference made between any of the organic foodstuffs as a source of energy, but, as Rubner expressed it: " Mute and still, by night and by day, the labor goes on in the workshops of life " and science has proved that material for the maintenance of life's workshops can be derived from protein foods only, since this chemical combination alone contains the nitrogen which is absolutely necessary to replace that which is constantly being used up in the body processes. The body must be kept in what is known as " nitrogen equilibrium " if life is to continue. According to Lusk " an infant has the power of transforming 40 per cent of the protein in its food into new structural machinery, the architecture of which depends upon the regrouping of the individual units formerly in the protein of milk. Thus new proteins are built whose internal arrangement is dependent upon local conditions in the various organs of the child." [11]

[11] "Basis of Nutrition," p. 18, Lusk.

Protein Needs of the Body. — The experiments carried on by all of the investigators prove that there is a constant necessity, as has already been stated, for a replenishment of the proteins in the body and that a definite amount is necessary in the food to protect the body from a loss of its own proteins. It has likewise been proved that these body proteins are spared more effectually when there is an ample amount of fuel foods allowed for the energy expenditures.

Proteins Producing Growth. — Formerly it was believed that all proteins had the ability to produce growth, but in late years this theory has been exploded. Osborne and Mendel have been making extensive experiments in the feeding of the various proteins. They found that while some of these substances produced normal growth and development in the animals to which they were fed, others did not. Upon further investigation it was proved that some of the proteins did not contain all of the protein units and some of them could not be transformed in the body to form complete protein, hence the animals fed upon these incomplete proteins lost weight and eventually died unless the diet was changed. Examples of the incomplete proteins may be found in gelatine,[12] gliadin (one of the proteins of wheat), and zein, the alcohol-soluble protein which forms over half the protein content of Indian corn.

Source of Growth-producing Proteins. — The complete proteins or proteins capable of producing growth are found in the casein of milk or albumen of eggs, and the proteins of meat and the glutenin of wheat. These so-called " complete proteins " provide for both the maintenance and the growth factors in the body, as well as for much of the energy expended. Thomas has estimated that the following minimum amounts are required to protect the body proteins from loss : [13]

TABLE XVII

Meat protein	30 grams
Milk protein	31 grams
Rice protein	34 grams
Potato protein	38 grams
Bean protein	54 grams
Bread protein	76 grams
Indian corn protein	102 grams

[12] "It has long been known that gelatine as a sole protein food does not suffice for the maintenance of nitrogen equilibrium." Sherman.

[13] Table taken from Lusk's "Basis of Nutrition," p. 20.

Thus it is seen that distinction is made between the animal and the vegetable proteins; more of the latter is required to prevent loss of body protein than of the former. In the experiments with white rats Osborne proved that when he fed zein the rat lost weight and died unless a change was made and the zein was replaced by other proteins capable of overcoming the condition.

As a Protection against Cold. — Lusk states that protein has one property out of all proportion to that possessed by the other foodstuffs: it largely increases the production of heat in the body and individuals kept on a diet low in protein are apt to suffer intensely with the cold. He further states that "a good piece of beefsteak or roast beef will put the heat production on a higher level and a person going out of doors on a cold day after a meal high in protein does not feel the cold." This is probably the reason why one instinctively avoids meat when the weather is hot.

SUMMARY

In summarizing the various factors which affect the food requirements of all ages, we find that age, appetite, and sleep, type of occupation, and the manner of living all exert a certain amount of influence. The man who sits all day at his desk may work just as hard as the clerk who does his bookkeeping standing up, but the latter will require more food to meet the requirements of his body than the man sitting down. The short fat man will require less food than the tall thin one even if their weight is practically the same. The man who does manual labor out of doors uses up more food material than the man who labors within four walls. In health the appetite is a fairly good guide to the amount of food one needs, unless habit has caused the individual to constantly consume more than the body calls for. If the digestion is good and the weight normal, that is, if there is no great fluctuation either of gain or loss of weight during the year, it is fairly certain that the amount of food ingested is commensurate with the energy expenditures of the body. When, however, there are evidences of disturbed metabolism — gout, for example — it is well to observe Nature's danger signal and reduce the diet

until it simply covers the needs of the body instead of catering to the whims of the appetite.

Age and Weight. — As has already been stated, there are certain points to be kept in mind in attempting to provide an adequate diet for the human machine; *First*, the *age* and *weight*. The gain during infancy should be steady — an allowance of 40 calories per pound of body weight to cover the energy requirements and 4 protein calories per pound to cover the nitrogen needs. During the second and third years the energy requirements will be covered by 30 to 40 calories per pound and the nitrogen needs by 3 to 4 protein calories per pound. From the fifth to the eighth year the nitrogen needs continue to be covered by 3 to 4 protein calories per pound and the energy requirements by 35 to 37 calories per pound during the fifth year; 32 to 34 calories per pound during the seventh year. After the body has reached its full development its requirements will be met if sufficient protein is provided to cover its maintenance needs and if the energy calories are regulated according to the amount of exercise taken, keeping in mind that the energy requirements of a man at rest (sitting) will be about 2000 calories per day and that exercise, especially that taken in the open air, raises the energy needs of the body.

Guides to Amounts and Types of Food. — In the foregoing pages the standards to be used as **guides** as to the **amounts** and **types of food** have been given. But the nurse must remember that these standards are not infallible, but are subject to a certain amount of change according to the physical condition of the individual.

Metabolism in Normal and Abnormal Conditions. — In abnormal conditions the metabolism of the foodstuffs often remains good, but the type of the disease renders it unwise and inadvisable to put too much strain upon certain organs. Hence the food must be selected with this point in view. In these cases, however, it is the physician, not the nurse, who formulates the diet, but the nurse must be prepared to recognize any deviation from the normal behavior of food in the body by the symptoms which develop.

CHAPTER VIII

METHODS OF FEEDING IN NORMAL AND ABNORMAL CONDITIONS

THERE are several methods of feeding which have been adopted to meet the needs of the individual under various conditions: Feeding by mouth, gavage or forced feeding, rectal feeding (nutrient enemata), and inunction.

Feeding by Mouth. — The first method is the one used in health and in the majority of abnormal conditions. In cases where there is a certain abnormal development of the mouth or throat, and in some cases of insanity or unconsciousness, where for some reason it is impossible for the individual to swallow, this method cannot be used.

Forced Feeding. — With very young children and babies, gavage or forced feeding is found at times to be necessary. In these cases a small rubber catheter is introduced into the stomach through the nostrils and the milk or other fluid poured through the tube. In unconscious or insane patients it is often found necessary to insert a gag (a cork will serve the purpose) between the teeth to prevent the biting of the tube when it is inserted through the mouth into the stomach.

Food Used for Forced Feeding. — The food in these cases consists of reënforced soups, milk gruels, or nutrient beverages, not more than six or eight ounces given at one time. Finely chopped meat and vegetable purées have been given in this way when the digestion of the patient was not impaired, but when conditions rendered it necessary to resort to this method of feeding.

Technique of Gavage. — The apparatus used in gavage consists of a moderate sized soft rubber tube to which is attached a rubber or glass funnel and a "pinch cock." The tube should be filled with water to prevent air entering the stomach and causing pain or discomfort. In certain cases the patient refuses to swallow the tube and it will be found necessary to use some means to force the passage if the throat is shut off. By closing the nostrils the

patient will be obliged to breathe through the mouth, thus opening the passage into the throat through which the tube may be quickly slipped. In certain abnormal conditions the gastric organ is so badly impaired as to render it impossible for the patient to retain food taken in by way of the mouth. It is often found that food introduced into the stomach by means of the " stomach tube " will be retained and utilized which otherwise would be rejected. It is disagreeable, however, and should only be used when it is impossible to feed otherwise.

Rectal feeding is used when the other organs of digestion are impaired to such an extent as to render the need of more food obligatory. Many investigators believe that rectal feeding is absolutely useless, while others have firm faith in its efficacy.

Technique of Rectal Feeding. — The rectum should be cleansed by flushing with a soapsuds enema one hour before nutrient enema is given. This should be done once a day, in the morning. The cleansing enema may be either soapsuds, a solution of bicarbonate of soda, or boric acid (1 teaspoonful to the pint), or a saline solution. When there is much mucus, or if the rectum is inflamed, the soda or boric acid solution may be more soothing than the saline or soapsuds enema. After one hour's rest the patient should be given a nutrient enema.

The method of administering nourishment through the rectum is important. A nutrient enema injected only into the lower bowel not only does no good, but may actually cause a good deal of unnecessary discomfort to the patient.

Temperature of Enema. — Care must be taken not to have the temperature of the nutrient enema too hot or too cold or it will be promptly rejected. The patient is placed on the side with one knee flexed; the solution is poured into a fountain syringe bag or an enamel container (heat the container before pouring the solution into it or the latter will be chilled). The bag or container has attached to it a rubber tube with a cock adjusted so that only a small stream will flow in at a time. To the end of this tube a rubber rectal tube or catheter — 1 cm. (about $\frac{1}{2}$ inch) — is attached. This should be well greased (do not use glycerin as this substance

is irritating to the mucous lining of the rectum). The liquid should be allowed to fill the tube before it is inserted into the rectum, to prevent any air passing in with it. The tube should be inserted with a gentle twisting movement, using very little force or the tender mucous membranes will be injured. Insert the tube twelve or more inches, since the solution is more completely absorbed if given high up in the bowel. The bag containing the solution should be held only a few inches higher than the rectum, thus allowing only a small stream to pass in and allowing an air space above the stream for the passage of gas which may be accumulated in the upper part of the rectum. The tube should be allowed to remain in the rectum for fifteen or twenty minutes, then very gently withdrawn to prevent the liquid from being rejected. A pad of gauze may be pressed against the anus to assist the patient in retaining the enema. It is well to divert the attention of the patient also, to further assist her in retaining the liquid.

Duration of Rectal Feeding. — Rectal feeding cannot be substituted for a great length of time, first, because the patient cannot absorb sufficient nourishment in this way to fully cover the body requirements, and, second, because the rectum becomes more or less sensitive and will reject the liquid before it has an opportunity to be absorbed. From three to four nutrient enemas a day is about the limit for the average patient. Between the nutrient enemas it is advisable to give one of saline solution.

The following régime is practiced during the "Total Abstinence Period" in the treatment of gastric ulcer: 7 A.M., cleansing enema; 8 A.M., nutrient enema; 1 P.M., nutrient enema; 3 P.M., saline enema; 6 P.M., nutrient enema. One saline and one nutrient enema may be given during the night if the patient is very weak. She should not be wakened, however, to be given the enema.

Feeding by Inunction. — This method consists in the rubbing into the body of certain nutrient oils, such as olive oil, cocoanut oil, cocoa butter, etc. It is of little value, but is occasionally resorted to with very much emaciated and underfed infants, when digestional disorders make it impossible to introduce enough food by mouth to cover the needs of the body.

Nutrient Enemas [1]

No. 1. Milk and Egg

6 oz. milk — 1 egg — ½ oz. normal saline solution
1 tsp. pure peptone (this may be omitted) — 1 tube peptonizing powder dissolved in 1 tbs. water

Mix thoroughly and peptonize at a temperature of 110° F. for 1 hour.

No. 2

8 oz. milk — 3 eggs — 3 grains table salt

No. 3

8 oz. milk — 2 oz. glucose (grape sugar)

No. 4. Singer's Enema

125 gm. (about 4 oz.) milk — 1 or 2 egg yolks
125 gm. (about 4 oz.) wine — Salt
1 tsp. Witte's peptone

No. 5. Boas Enema

250 c.c. (8 oz.) milk — 1 tbs. of red wine
2 egg yolks — 1 tbs. "Kraftmehl" Health Flour
Small quantity of salt

No. 6.

6 oz. bouillon — 1 egg yolk
4 oz. red wine — 1 to 2 tsp. dry peptones

No. 7. Milk and Starch Enemas — Von Leube

250 c.c. (about 8 oz.) milk — 70 grains starch

Malted Milk Enema

Dissolve 1 oz. of malted milk in 8 oz. of hot water — 1 egg and ½ tsp. salt or ½ oz. saline solution

Normal Saline Solution

1 dram sodium chloride (common salt) — 1 pt. (16 oz.) water, (boiled)

[1] "Diet in Disease," by Freidenwald and Ruhrah and other sources.

TABLE

COMPOSITION AND FUEL VALUE OF MOST OF

Material[1]	Weight	Measure	Nitrogen
			%
A			
Almonds	½ oz.	6	.48
Apples	5.5 oz.	1 medium size	.09
Arrowroot	1 oz.	2 tablespoonfuls	—
Asparagus, fresh	4 oz.	6 stalks	.33
Asparagus, canned	4 oz.	½ cup	.28
B			
Bacon	1 oz.	2 slices	.35
Bananas, E. P.[2]	3½ oz.	1 medium	.20
Barley, pearled	1 oz.	2 tablespoonfuls	.39
Barley flour	½ oz.	1 tablespoonful	.24
Bass	3 oz.	1 serving	2.85
String beans	3 oz.	1 serving	.31
Butter beans	3 oz.	1 serving	1.26
Beef broth	1 oz.	2 tablespoonfuls	0.1
Beef broth	6 oz.	1 cup	0.5
Beef soup[3]	6 oz.	1 cup	1.18
Beef juice	1 oz.	2 tablespoonfuls	.22
Beef marrow	½ oz.	1 tablespoonful	.05
Beef steak (porterhouse)	3 oz.	1 serving	2.98
Sirloin	3 oz.	1 serving	2.57
Top of round	3 oz.	1 serving	2.75
Roast beef, second cut	2 oz.	1 slice	1.84
Roast beef, second cut	1 oz.	1 thin slice	.91
Bluefish	3 oz.		2.60
Brandy	½ oz.	1 tablespoonful, 14.17 grams	—
Bran	2½ oz.	1 cup	1.25
Bread	1 oz.	1 slice, ¾ in. thick	.42
Bread	12 oz.	1 loaf	5.04
Bread crumbs	5 oz.	1 cup	2.08
Bread, graham	1 oz.	1 slice	.40
Bread, gluten[4]	1 oz.	1 slice, ½ in. thick	1.34
Maryland biscuit (Southern beaten biscuit)	1 oz.	2 small biscuits	.38

* All determinations allow 28.35 grams to the ounce.

All calculations are made using the factor 4 calories for protein, 4 calories for carbohydrates and 9 calories for fats.

[1] The materials are measured in standard 8-ounce measuring cups, or tablespoons. The measures are exactly level unless otherwise stated. In calculating beverages containing alcohol, it is necessary to know the percentage of alcohol con-

XVIII

THE FOODS USED IN THE INVALID DIETARY*

Proteins		Fats		Carbohydrates		Fuel Value
%	Gm.	%	Gm.	%	Gm.	
21.0	2.975	54.9	7.78	17.3	2.45	91.7
0.4	.6	0.5	.77	14.2	22.2	98.3
—	—	—	—	69.2	19.6	78.4
1.8	2.04	0.2	.24	3.3	3.72	25.2
1.5	1.72	0.1	.12	2.8	3.16	20.6
7.8	2.2	48.4	13.7	—	—	132.
1.3	1.25	0.6	.59	22.0	21.84	97.6
8.5	2.41	1.1	.31	78.0	22.05	100.7
10.4	1.48	2.2	.31	72.6	10.31	49.9
21.0	17.8	2.8	2.37	—	—	92.5
2.3	1.95	2.7	2.29	7.4	6.29	34.45
9.3	7.9	0.6	.51	29.2	24.7	134.9
1.8	0.6	0.1	0.3	—	—	2.7
2.2	3.7	0.1	.18	—	—	16.3
4.3	7.4	3.6	6.1	1.1	1.8	42.9
4.9	1.39	.6	.17	—	—	7.
2.2	.31	92.4	13.1	—	—	119.1
22.0	18.63	20.4	17.34	—	—	230.5
19.0	16.08	18.5	15.72	—	—	205.8
20.3	17.2	13.6	11.5	—	—	172.3
20.2	11.5	8.4	4.8	—	—	89.2
20.1	5.7	8.5	2.4	—	—	44.4
19.6	16.6	1.2	1.	—	—	75.4
—	—	—	—	—	—	42.
11.0	7.8	2.1	1.5	61.2	43.4	218.
9.2	2.6	1.2	.34	52.6	14.9	73.
9.3	31.5	1.2	4.08	52.6	178.8	876.
9.2	13.	1.2	1.70	52.5	74.5	405.3
8.8	2.5	1.8	.51	51.9	14.7	73.
29.7	8.4	1.1	.30	30.0	8.5	70.3
8.4	2.38	5.6	1.5	60.0	17.	91.7

tained therein. Alcohol has a fuel value of 7 calories per gram. (Whether this heat is available for the needs of the body is still a question.)

[2] Edible portion.

[3] Beef soup is not so thoroughly strained or so well skimmed as broth.

[4] Gum gluten has a smaller percentage of starch than ordinary gluten flour.

TABLE

Material	Weight	Measure	Nitrogen %
B			
Butter	1 oz.	2 tablespoonfuls	.04
Butter	1 lb.	2 cups	.72
C			
Carrots	3 oz.	1 medium	.15
Carrots	1 oz.		.05
Cauliflower	3 oz.	1 serving	.24
Cauliflower	1 oz.		.08
Celery	1 oz.	1 stalk medium size	.05
Clam bouillon	1 oz.	2 tablespoonfuls	.01
Clam bouillon	6 oz.	¾ cup	.05
Cheese (American)	1 oz.	2 tablespoonfuls, grated	1.31
Cottage cheese (curds)	1 oz.	2 tablespoonfuls	.95
Neuchâtel (cream cheese)	1 oz.	½ block	.85
Chicken (broiler E. P.)	1 oz.		.97
Chicken (broiler E. P.)	3 oz.	1 serving	2.92
Chocolate (unsweetened)	1 oz.	1 square	.58
Cocoa	1 oz.	4 tablespoonfuls	.98
Cocoa	⅛ oz.	2 teaspoonfuls (1 serving)	.12
Condensed milk (Eagle brand) (sweetened)	1 oz.	2 tablespoonfuls	.40
Condensed milk (Eagle brand) (sweetened)	⅛ oz.	1 teaspoonful	.07
Condensed milk (unsweetened)	⅛ oz.	1 teaspoonful	.07
Consommé	6 oz.	¾ cupful	1.06
Corn (canned)	1 oz.	2 tablespoonfuls	.13
Corn (green E. P.)	1 oz.	2 tablespoonfuls	.14
Cornmeal (granular)	1 oz.	2 tablespoonfuls	.42
Cornflakes[5] (toasted)	1 oz.		.25
Cornstarch	1 oz.	3 tablespoonfuls	—
Crackers (graham)	⅓ oz.	1 cracker	.15
Crackers (water)	⅓ oz.	1 cracker	.19
Crackers (oyster)	1 oz.		.51
Cracker crumbs	2½ oz.	½ cup	1.32
Cranberries	1 oz.	2 tablespoonfuls	.02
Cream 18% (single X)	1 oz.	2 tablespoonfuls	.13
Cream 40% (double XX)	1 oz.	2 tablespoonfuls	.10
Cucumber, E. P.	1 oz.		.04
Currants (dried)	1 oz.	2 tablespoonfuls	.11

[5] Ontario Department of Agriculture Bulletin 162.

XVIII — *Continued*

Proteins		Fats		Carbohydrates		Fuel Value
%	Gm.	%	Gm.	%	Gm.	
1.0	.28	85.1	24.09	—	—	217.3
1.0	4.53	85.1	385.5	—	—	3488.
1.1	.93	0.4	.33	9.3	7.89	38.2
1.1	.31	0.4	.11	9.3	2.63	12.7
1.8	1.53	0.5	.42	4.7	3.99	25.8
1.8	.51	0.5	.14	4.7	1.33	8.6
1.1	.31	0.1	.03	3.3	.93	5.2
0.2	.057	—	—	0.2	.057	.45
0.2	.342	—	—	0.2	.342	2.65
28.8	8.16	35.9	10.18	0.3	.09	124.6
20.9	5.92	1.0	.283	4.3	1.21	31.12
18.7	5.30	27.5	7.78	1.5	.42	92.8
21.5	6.09	2.5	.708	—	—	31.7
21.5	18.27	2.5	2.10	—	—	92.
12.9	3.65	46.7	13.80	30.3	8.59	173.3
21.6	6.12	28.9	8.19	37.7	10.69	141.
21.4	.76	28.7	1.02	37.5	1.33	17.5
8.8	2.49	8.3	2.35	53.9	15.34	92.2
11.6	.41	15.5	.55	72.0	2.55	12.3
12.6	.446	12.4	.441	14.9	.528	7.84
3.9	6.63	—	—	0.4	.68	19.5
2.8	.79	1.2	.34	19.0	5.39	27.8
3.1	.88	1.1	.31	19.7	5.38	28.7
9.3	2.61	1.9	.54	75.5	21.38	100.8
5.5	1.56	1.5	.43	81.2	23.	102.1
—	—	—	—	89.1	25.52	102.
10.0	.94	9.3	.88	73.8	6.97	39.5
12.7	1.2	0.5	.05	80.5	7.6	40.
11.3	3.20	10.5	2.98	70.5	19.98	119.5
11.6	8.25	6.3	4.5	77.7	55.1	294.
0.4	.11	0.6	.17	10.0	2.81	13.2
0.3	.8	19.7	5.6	4.9	1.4	59.2
2.2	.62	40.0	11.34	3.0	.85	107.9
0.8	.23	0.2	.06	3.1	.88	4.9
2.4	.68	1.7	.48	74.2	21.04	91.2

TABLE

Material	Weight	Measure	Nitrogen %
D			
Dates (dried)	1 oz.		.09
Dry peptonoids	1 oz.	2 tablespoonfuls	.96
E			
Eggs (whole without shell)	39.69 grams	1 medium size	.86
Egg (white)	$\frac{9}{10}$ oz.	1 white	.50
Egg (yolk)	$\frac{1}{2}$ oz.	1 yolk	.34
F			
Farina	1 oz.	3 tablespoonfuls	.50
Figs (dried)	1 oz.	1 fig	.19
Flour (barley)	1 oz.	2 tablespoonfuls	.46
Flour (gum gluten)	1 oz.	3 tablespoonfuls	1.65
Flour (graham)	1 oz.	3 tablespoonfuls	.60
Flour (wheat)	1 oz.	3 tablespoonfuls	.51
Flour (wheat)	$\frac{1}{3}$ oz.	1 tablespoonful	.17
Flour (entire wheat)	1 oz.	3 tablespoonfuls	.63
Fowl, E. P.	1 oz.		.88
Fowl, E. P.	3½ oz.	1 serving	3.09
G			
Gelatine (granulated)	1 oz.		4.15
Gelatine (granulated)	$\frac{1}{4}$ oz.	1 tablespoonful	1.04
Gum gluten bread	1 oz.	1 slice	1.34
Gum gluten biscuit	$\frac{1}{4}$ oz.	1 biscuit	.47
Greens, A. P. (turnips)	4 oz.		.75
Greens, A. P. (beet tops)	4 oz.		.38
Greens, cooked	4 oz.	1 serving	.37
Grapes, malaga	2 oz.	Bunch (about 12 grapes)	.12
Grapes, malaga	1 lb.		.95
Grape juice	1 oz.	2 tablespoonfuls	—
Grape juice	4 oz.	½ cupful	—
H			
Halibut, E. P. steak	3 oz.	1 serving	2.53
Ham (lean), smoked, E. P.	1½ oz.	1 serving (1 slice)	1.35
Ham (medium smoked) fat	1 oz.	1 slice	.74
Hominy	1 oz.	2 tablespoonfuls	.38
Hickory nuts (shelled)	1 oz.	2 tablespoonfuls	.70
Honey	1 oz.		.02

XVIII — *Continued*

Proteins		Fats		Carbohydrates		Fuel Value
%	Gm.	%	Gm.	%	Gm.	
2.0	.59	2.8	.79	84.4	22.2	98.2
21.1	6.	—	—	28.2	8.	56.
13.5	5.35	10.5	4.16	—	—	59.8
12.2	3.1	0.2	.054	—	—	13.
14.8	2.1	31.8	4.5	—	—	48.
10.9	3.11	1.4	.39	76.4	21.63	102.6
4.3	1.21	0.3	.09	74.1	21.	89.8
10.2	2.9	2.2	.62	72.7	20.6	99.7
36.3	10.3	1.3	.36	36.9	10.44	86.2
13.3	3.77	2.2	.62	71.4	20.24	101.7
11.2	3.18	1.0	.28	75.2	21.24	100.2
11.2	1.06	1.0	.09	75.2	7.08	33.4
13.8	3.91	1.9	.53	71.9	20.38	102.
19.5	5.51	16.4	4.65	—	—	63.9
19.5	19.3	16.5	16.3	—	—	224.
91.5	25.91	0.1	.028	—	—	103.8
91.2	6.47	0.1	.007	—	—	26.8
29.7	8.4	1.1	.30	30.0	8.5	70.3
41.9	2.94	1.8	.13	44.4	3.15	25.5
4.1	4.7	0.6	.68	6.3	7.1	53.3
2.1	2.4	3.3	3.8	3.2	3.6	58.2
2.0	2.3	0.3	.3	3.2	3.6	26.3
1.3	.74	1.6	.9	19.1	10.88	54.5
1.3	5.9	1.6	7.26	19.2	87.09	437.3
—	—	—	—	25.0	7.09	28.3
—	—	—	—	25.0	28.36	113.4
18.7	15.81	5.2	4.41	—	—	102.9
19.8	8.41	21.0	8.95	—	—	114.1
16.3	4.62	38.8	11.	—	—	117.5
8.3	2.36	0.6	.17	79.0	22.39	100.5
15.4	4.36	67.1	19.	11.4	3.22	201.3
0.4	.11	—	—	81.3	23.02	92.5

TABLE

Material	Weight	Measure	Nitrogen %
J			
Jell-O	3.5 oz.	1 box	1.79
Jell-O	.6 oz.	1 serving	.30
K			
Koumiss	1 litre	1000 c.c.	4.01
Koumiss	4 oz.	½ glassful	.51
L			
Lactose (sugar of milk); 100 per cent carbohydrates	1 oz.	2 tablespoonfuls	—
Lady fingers	½ oz.	3 lady fingers	.20
Lamb chops (broiled)	3 oz.	2 chops, medium size	2.95
Lard	1 oz.	2 tablespoonfuls	—
Lemon juice (1 lemon)	1½ oz.	3 tablespoonfuls	—
Lemon juice	1 oz.	2 tablespoonfuls	—
Lettuce	8 oz.	1 head	.44
Lettuce	2 oz.	1 serving (¼ head)	.11
Liquid peptonoids	1 oz.	2 tablespoonfuls	.26
Lentils	1 oz.	2 tablespoonfuls	1.17
Lobster	2 oz.	1 serving	1.75
M			
Macaroni	4 oz.	½ cupful	2.43
Mackerel (fresh, E. P.)	3 oz.	1 serving	2.54
Mackerel, salt dressed, E. P.	2 oz.	1 serving (small)	1.57
Malted milk (Horlick's)	½ oz.	1 tablespoonful	.37
Milk (whole)	1 oz.	2 tablespoonfuls	.15
Milk (whole)	8 oz.	1 glassful	1.20
Milk (skimmed)	1 oz.	2 tablespoonfuls	.15
Molasses (cane)	1 oz.	2 tablespoonfuls	.11
Muskmelons	8 oz.	½ small melon	.22
N			
Noodles (gluten)	2 oz.	¾ cup	2.05
O			
Oatmeal	½ oz.	1 tablespoonful	.38
Oatmeal (gruel)	4 oz.	½ cupful	.21
Oats (rolled)	1 oz.		.76
Olives	½ oz.	3 medium size	.02
Olive oil	1 oz.	2 tablespoonfuls	—
Onion	2 oz.	1 medium size	.07
Orange	5 oz.	1 medium size	.14

XVIII — *Continued*

Proteins		Fats		Carbohydrates		Fuel Value
%	Gm.	%	Gm.	%	Gm.	
11.3	11.2	—	—	87.3	86.4	395.
11.2	1.9	—	—	84.7	14.4	66.
2.8	25.4	2.1	19.5	5.4	48.9	473.
2.8	3.17	2.1	2.43	5.4	6.11	58.9
—	—	—	—	100.0	28.35	113.4
8.7	1.24	4.9	.70	70.5	10.	51.2
21.8	18.45	30.0	25.44	—	—	202.7
—	—	100.0	28.35	—	—	255.2
—	—	—	—	9.7	4.12	16.4
—	—	—	—	9.8	2.77	11.
1.2	2.72	0.3	.72	2.9	6.50	43.2
1.2	.68	0.3	.18	2.0	1.14	10.8
5.6	1.6	—	—	14.8	4.2	56.
25.7	7.29	1.0	.28	59.2	16.78	98.8
18.2	10.34	1.1	.62	0.5	.28	48.4
13.4	15.20	0.9	1.0	74.0	84.	406.
18.8	15.90	7.1	6.03	—	—	117.8
17.3	9.82	26.3	14.96	—	—	173.9
16.2	2.3	8.5	1.2	66.9	9.5	58.
3.3	.94	4.0	1.13	5.0	1.41	19.6
3.3	7.52	4.0	9.04	5.0	11.28	156.5
3.4	.96	0.3	.09	5.1	1.45	10.4
2.4	.68	—	—	69.4	19.65	81.3
0.6	1.36	—	—	9.3	21.12	89.9
22.5	12.8	2.1	1.2	16.3	9.28	99.3
16.9	2.4	7.1	1.	65.9	9.5	56.9
1.1	1.3	0.4	.45	0.6	7.3	38.4
16.7	4.73	7.3	2.07	66.3	18.77	112.6
10.6	.15	27.6	3.91	11.6	1.64	42.3
—	—	100.0	28.35	—	—	255.1
0.8	.45	0.2	.09	4.9	2.80	13.8
0.6	.85	0.1	.15	8.6	12.05	53.

TABLE

Material	Weight	Measure	Nitrogen %
O			
Orange (juice)	1 oz.	2 tablespoonfuls	—
Oysters	1 oz.	3 small	.28
P			
Panopepton	1 oz.	2 tablespoonfuls	.32
Parsnips	1 oz.	1 medium size	—
Peaches, E. P. (fresh)	3 oz.	1 medium size	.10
Peaches, canned	3 oz.	1 serving	.10
Peanut butter	1 oz.	2 tablespoonfuls	1.33
Peanuts, shelled	2½ oz.	½ cupful	3.32
Pears, fresh	3 oz.	1 medium size	.08
Pears, canned	3 oz.	1 serving	.04
Peas, green (fresh, E. P.)	3 oz.	1 serving, about ½ cup	.95
Peas, canned	4 oz.	½ cup	.65
Peas (dried, split peas)	1 oz.	3 tablespoonfuls	1.12
Pineapple (canned)	3 oz.	1 thick slice	.07
Pineapple (fresh, E. P.)	3 oz.	1 serving	.05
Pecans, shelled	2½ oz.	½ cup	.58
Port wine (10% alcohol)	½ oz.	1 tablespoonful	—
Potatoes (white raw)	3 oz.	1 medium size	.30
Potatoes (sweet raw)	4 oz.	1 medium size	.33
Prunes (A. P.)	1 oz.	3 A. P.	.08
Prunes (E. P.)	4 oz.	1 cupful	.38
Q			
Quail	3½ oz.	½ quail, 1 serving	1.00
R			
Raisins	1 oz.	3 dozen	.12
Raspberries (black, fresh)	1 oz.	3 tablespoonfuls	.08
Raspberries, fresh, juice	4 oz.	½ cup	—
Rhubarb, fresh, E. P.	1 oz.		.03
Rhubarb	3 oz.	1 serving	.08
Rice	1 oz.	2 tablespoonfuls, 1 serving	.36
Rum	1 oz.	2 tablespoonfuls	—
S			
Salmon (canned)	1 oz.		.99
Salmon (canned)	1 lb.	1 can	15.82
Saltines (crackers)	1 oz.		.48
Saltines (crackers)	1 lb.	1 box	7.68
Sardines (canned)	1 oz.	1 small serving	1.08

XVIII — *Continued*

Proteins		Fats		Carbohydrates		Fuel Value
%	Gm.	%	Gm.	%	Gm.	
—	—	—	—	11.3	3.2	12.8
6.2	1.75	1.2	.34	7.4	2.10	18.4
7.1	2.	—	—	17.3	5.	60.
0.1	.016	—	.005	0.5	.135	.65
0.7	.60	0.1	.09	9.4	8.01	35.2
0.7	.60	0.1	.09	10.8	9.18	39.9
29.3	8.31	46.6	13.20	17.1	4.85	151.4
29.3	20.77	46.5	33.	5.8	4.12	396.5
0.6	.51	0.5	.42	14.2	12.	53.7
0.3	.27	0.3	.27	18.1	15.30	64.5
7.01	5.94	0.5	.42	15.9	14.37	84.9
3.6	4.08	0.2	.24	9.8	11.12	62.8
24.5	6.97	1.0	.28	62.0	17.57	100.7
0.5	.4	0.7	.6	36.6	31.	130.
0.4	.33	0.3	.27	9.7	8.25	36.6
5.1	3.60	37.6	26.7	8.2	5.80	553.
—	—	—	—	—	—	10.
2.2	1.86	0.2	.09	17.5	15.66	70.6
1.8	2.04	0.7	.80	27.4	31.08	139.6
1.8	.51	—	—	62.2	17.63	72.5
2.11	2.40	—	—	73.1	83.12	342.
6.22	6.22	5.7	5.7	—	—	113.3
2.6	.74	3.3	.94	76.0	21.57	97.7
1.7	.48	1.0	.28	12.6	3.57	18.8
—	—	—	—	10.0	11.3	45.2
0.6	.17	0.7	.20	3.6	1.02	6.6
0.6	.51	0.7	.60	3.6	3.06	19.6
7.9	2.26	0.3	.09	79.0	22.39	99.4
—	—	—	—	—	—	76.
21.8	6.18	12.1	3.43	—	—	55.6
21.8	98.87	12.1	54.88	—	—	889.
10.6	3.	12.7	3.60	68.5	19.42	122.1
10.6	48.	12.7	57.60	68.5	310.70	1953.52
23.7	6.72	12.1	3.43	—	—	57.7

TABLE

Material	Weight	Measure	Nitrogen %
S			
Shad	3 oz.	1 serving	1.96
Shad roe	1 oz.	1 small serving	.95
Sherry wine	1 oz.	2 tablespoonfuls	—
Spinach	4 oz.	½ cupful	.38
Squab	2½ oz.	½ squab	1.86
Squash	3 oz.	1 serving	.10
Strawberries	3 oz.	1 serving, about ½ cupful	.13
Strawberry juice	4 oz.	½ cup	—
Suet	1 oz.	2 tablespoonfuls packed solid	.21
Sugar (granulated)	1 oz.	2 tablespoonfuls	—
Sugar loaf	¼ oz.	1 lump	—
Sugar (powdered)	⅓ oz.	1 tablespoonful	—
Sweetbreads	3 oz.	1 serving	2.28
Sweetbreads	8 oz.	1 set	6.08
T			
Tapioca	1 oz.	2 tablespoonfuls	.02
Tapioca (minute)	1 oz.	2 tablespoonfuls	.02
Tomatoes (fresh)	5 oz.	1 whole tomato	.07
Tomatoes (canned)	1 oz.	2 tablespoonfuls	.05
Trout	3 oz.	1 serving	2.46
Trout	1 oz.		.82
Turnips (fresh)	3 oz.	1 serving	.18
Turkey	2½ oz.	1 serving (2 slices)	2.39
Turkey	1 oz.		.96
W			
Walnuts	1 oz.		.84
Walnuts	5½ oz.	1 cupful	4.59
Wheat (shredded)	1 oz.		.55
Wheat flakes	1 oz.	1 cupful (about)	.61
Whey	6 oz.	1 cupful	.27
Z			
Zwieback	1 oz.	3 small slices	.44

XVIII — *Continued*

Proteins		Fats		Carbohydrates		Fuel Value
%	Gm.	%	Gm.	%	Gm.	
14.4	12.24	9.5	8.07	—	—	121.5
20.9	5.92	34.2	9.69	2.6	.73	113.7
—	—	—	—	—	—	28.
2.1	2.36	0.3	.36	3.2	3.64	27.2
16.4	11.62	36.4	25.85	—	—	279.1
0.7	.60	0.2	.18	4.5	3.84	18.3
1.0	.84	0.6	.51	7.4	6.30	33.
—	—	—	—	4.8	5.5	22.
4.7	1.33	81.9	23.19	—	—	214.
—	—	—	—	100.0	28.35	113.40
—	—	—	—	100.0	7.1	31.2
—	—	—	—	100.0	9.45	37.8
20.5	14.25	13.2	10.29	—	—	149.61
16.7	38.	12.1	27.4	—	—	398.
0.4	.11	0.1	.03	88.1	24.95	100.5
0.4	.11	0.1	.03	88.1	24.95	100.5
0.3	.42	0.2	.28	2.1	3.11	16.
1.2	.34	0.2	.06	3.8	1.13	6.4
18.1	15.4	10.3	8.76	—	—	140.4
18.1	5.13	10.3	2.92	—	—	46.8
1.3	1.11	0.2	.18	8.1	6.90	33.6
21.1	14.94	22.8	16.22	—	—	205.7
21.1	5.98	22.6	6.39	—	—	81.4
18.4	5.22	64.5	18.26	13.0	3.69	200.
18.4	28.71	64.5	100.43	13.0	20.39	1099.6
12.1	3.43	1.8	.51	75.2	21.31	103.6
13.4	3.80	1.4	.39	74.3	21.06	103.
1.0	1.70	0.3	.51	4.4	7.50	41.3
9.8	2.77	1.0	2.80	73.5	20.83	119.6



SECTION III

NUTRITION IN DISEASE

CHAPTER IX

PREGNANCY AND LACTATION

THERE are many traditions in regard to the food requirements of the prospective mother. Many of these have been proved fallacies. As a matter of fact it is the woman more than the developing child who is likely to suffer if the diet is insufficient or badly balanced.

Factors Affecting Diet during Pregnancy. — In formulating a dietary for the pregnant woman, then, not only must the needs of the child be considered but those of the mother also, since the developing embryo draws from the body of the woman materials necessary for its growth, and if these needs are not covered by an increase in the diet, her body and that of the child also will show evidences of lack of nourishment.

Phosphorus and Calcium Requirements. — If, for example, the mother's diet is lacking in those materials which produce growth, or is deficient in those mineral salts, such as phosphorus and calcium, which are requisite and necessary for the growth of bones in the infant, the mother's bones and teeth will show this loss and in all probability the baby will sooner or later also show a like deficiency. However, it must be remembered that the pregnant woman is under a strain, both physical and mental. She must not be encouraged to eat beyond her needs or the digestion will be disturbed.

Nutritional Disturbances in Early Months. — The nutritional disturbance manifested by nausea and vomiting in the morning is due, not to the stomach or any disturbance therein, but to the fact that a mild form of poisoning occurs, resulting from the substances produced through the formation of the placenta reaching the general circulation on account of the incomplete establishment of the connection between the embryo and the mother. As soon

as this connection is complete and fetal circulation is established this " morning sickness " disappears.

Food Requirements of Prospective Mother. — The food requirements of the prospective mother are not materially affected during the first four months of gestation, and even after this, when the infant is developing rapidly, and up to the date of its birth, the mother's requirements are only increased about 20%. The amount of food necessary to cover the body needs, for maintenance and energy of a woman living a sedentary or moderately active life, plus 20% for building materials for the growing child, will be adequate for the pregnant woman. Thus, if her needs are ordinarily from 2000 to 2400 calories per day, after the fourth month they will probably be increased to 2400 or 2800 calories a day and will rarely ever be more than 3000 calories a day.

Dietetic Treatment of Normal Pregnancy. — The peculiar conditions surrounding the woman at this particular time must be taken into consideration in arranging her diet. The building foods which are necessary for the developing child must be given in the simplest form, milk and eggs being used liberally and meat sparingly to obviate any unnecessary tax being placed upon the kidneys. The use of fruit and green vegetables to supplement the milk and eggs is urged. It has been found advisable at such times to give small meals frequently rather than the regular meal three times a day. The feeling of " fullness " which often occurs during the last two or three months of gestation makes it more comfortable for the pregnant woman to eat less at a time and oftener. If, for example, she be given a glass of rich milk or a nutrient beverage, either of enforced malted milk, albumenized orange juice, buttermilk, zoolak, or koumiss, at about eleven o'clock in the morning and again about four o'clock in the afternoon, she will have taken sufficient nourishment to meet the new requirements without taxing her digestion or imposing extra work upon the kidneys.

Abnormal Symptoms. — The chief point to keep in mind is the abnormal symptoms which may develop. The chief of these is albumen in the urine. The urine must be examined frequently

and measures taken immediately to overcome albuminuria should it occur. It is wise, as has already been stated, to restrict the meat in the diet, and in cases where albumen is found in the urine even when the meats are restricted, it may be necessary to place the patient upon a milk diet for a time until the urine clears up.

Supplementary Feeding. — Cereals, especially the whole cereals, must be used liberally. Gruels made with milk are often found valuable additions to the dietary. The prospective mother must be urged to take a regular amount of gentle exercise, not to become overtired, or excited, to eat sparingly at night, and to drink plenty of water. She must avoid becoming constipated by eating plenty of green vegetables and fruit.

Sample Diet Sheets. — The following dietary is suggested: Breakfast should consist of thoroughly cooked cereals, wheatena, cream of wheat, malt breakfast food, cracked wheat, rolled or cracked oats, served with cream or sugar or both, whole wheat bread, muffins, or biscuits, with butter, raw or stewed fruit, coffee, tea or cocoa with milk. Luncheon may consist of milk or vegetable soups, eggs in any form, boiled potatoes, sweet potatoes, string beans, greens, or any green vegetables, simple desserts such as custards, rice or tapioca puddings, bread pudding, etc., milk, tea, cocoa, buttermilk, zoolak or koumiss as beverages. For dinner, if albuminuria is not present, a small piece of meat may be taken, together with green vegetables, rice, potatoes, simple salads, and a simple dessert, milk or coffee with milk as a beverage.

Selection of Food. — The following foods may be used to formulate the diet sheet: Wheat, oat, or corn cereals, rice, tapioca, made into simple puddings or served as breakfast foods; fruits, oranges, prunes, apples, raisins, dates, figs, or grapefruit, stewed or raw. The fruit juices may be used instead of the whole fruit if the latter disagrees. Vegetables: peas (green or dried), beans (string beans or dried beans), spinach, greens (turnip, mustard, or beet), cabbage, onions, celery, lettuce, served as vegetables or in soups, potatoes. Meat: lightly broiled beefsteak or stewed or boiled meat or chicken served not more than once a day or three times a week. Eggs, prepared in different ways. Cheese dishes.

Breakfast bacon or ham in moderate quantities, butter, olive oil (or other salad oils) in moderation, whole wheat, graham or bran bread, Boston brown bread and crackers, milk, cocoa, chocolate, buttermilk, malted milk, koumiss, or zoolak; coffee and tea in moderation.

The diet, as has already been stated, may be supplemented by nutrient beverages or milk gruels.

DIET IN LACTATION

The diet of the nursing mother, as has been explained in a previous chapter, must not only cover her own requirements but must likewise be adequate to furnish the extra requirements imposed by the nursing infant.

Food Requirements of Nursing Infant. — When the baby is a month old he should be growing rapidly, and his food requirements at this period and until he is about three months old will be approximately fifty calories per pound of body weight in the twenty-four hours. As he grows older his requirements grow gradually less in proportion to his weight. This is because the rate of growth is less, so that for the next three months the requirements are from 43 to 40 calories per pound of body weight per day, and 35 calories per pound during the last three months, or by the end of the first year of life.

It has been estimated, as before stated, that the average infant will take $2\frac{1}{3}$ to $2\frac{1}{2}$ ounces of mother's milk per day [1] to each pound of body weight and that every ounce of mother's milk will yield on an average 20 calories. Hence a month-old baby weighing ten pounds will be taking about 23 ounces a day, yielding 460 calories. Scientists have estimated that for every calorie produced by the milk two extra calories must be provided by food, so that for the baby requiring 460 calories per day, to cover his requirements the mother will be obliged to consume extra food to yield 920 calories, or the regular amount to meet her normal requirements plus the extra food to make sufficient food for the baby.

[1] "Feeding the Family," p. 93, by Mary Swartz Rose.

Diet of Nursing Mother. — The diet of the nursing mother need not be different from that to which she is accustomed. She should be warned against overwork or over-fatigue, nervous excitement and worry, since these factors affect the digestion of the nursing baby. She must be careful not to eat indigestible foods or foods which disagree with her, as such things will undoubtedly affect the digestion of the infant. When an article of food does cause digestional disturbances in the baby, it should be carefully omitted from the mother's diet.

Factors Retarding and Stimulating Milk Secretion. — Constipation in the mother reacts quickly and unfavorably upon the secretion of milk. The same has proved to be the case when she becomes excited, nervous, worried, or over-tired.

The average diet for the normal woman is safe for the nursing mother. If her supply of milk is deficient, it may be at times increased or stimulated by the drinking of a glass of milk between meals or by taking a cup of hot cereal milk gruel. It was formerly believed that beer, ale, or stout acted directly upon the mammary glands, stimulating the secretion of milk, but there is little proof of this and the drinking of alcoholic beverages need not be encouraged on this account, since often more nourishing beverages fulfill the purpose more efficiently and without bad results.

SUMMARY

Gastric Disturbances. — The nausea and vomiting so often a part of early pregnancy is not believed to be the result of a disordered stomach but primarily a mild form of poisoning resulting from the incomplete establishment of the fetal circulation.

Adjusting the Diet. — The adjustment of the diet to cover the needs of the prospective mother and those of the developing child is essential. The amount of food taken by the mother is not materially changed during the first three months of gestation. An average normal diet is all that is necessary. After this time a twenty per cent increase in the woman's diet will furnish adequate means both for her maintenance and for the growth and development of the child.

Type of Food. — The kind of food which is necessary for the pregnant woman to take during this period is very similar to that taken ordinarily. It is necessary to furnish food materials rich in calcium and phosphorus, with an adequate supply of proteins in their simplest form in order to meet the requirements of the growing organism. Milk and eggs furnish the most efficient foods in this respect and the prospective mother should see that they form the chief items of her daily dietary. Milk furnishes calcium in its most available form for the developing skeleton of the growing infant, hence it is necessary to provide the mother with food to replace the mineral which is withdrawn from her body.

Meat in the Diet. — Meat should be eaten sparingly by the prospective mother, as it imposes needless work upon the already taxed kidneys and, if eaten in excess, will give rise to dangerous complications. Milk and eggs will provide ample protein for all purposes.

Albumen in the Urine. — Albuminuria is one of the most frequent complications in pregnant women. It should be combated and controlled as soon as possible. The allowance of meat should be cut down or entirely eliminated from the diet until the urine clears up. When albuminuria is persistent in spite of efforts to overcome it, the patient must be placed upon a strict milk diet as used in acute nephritis, to prevent dangerous complications arising.

LACTATION

Diet of Mother. — Her dietary need not differ materially from that to which she is accustomed. She must avoid indigestible foods or any article which has been proved to disagree with either the infant or herself.

Factors Regarding Secretion of Milk. — Constipation, worry, nervous excitement, and over-fatigue all have an unfavorable effect upon the secretion of milk and must therefore be avoided by the nursing mother.

The Bowels. — Constipation of the mother reacts quickly and unfavorably upon the health and comfort of the baby, hence it

should be avoided by eating coarse breads, green vegetables, and fruits, when they do not disagree with the baby, by drinking plenty of water and taking a certain amount of outdoor exercise to keep her own health in good condition.

Stimulating the Milk Production. — When the milk supply is deficient it will be advisable for the mother to drink a glass of milk or a bowl of cereal milk gruel between meals. Alcoholic beverages are not necessary to insure an adequate secretion of milk. The milk or milk gruels answer the purpose more efficiently and without bad results.

Energy Requirements of Infant. — The average baby requires fifty calories per day per pound of body weight to cover his energy growth and development needs for the first three months of life, after which the rate of growth is less and his requirements decrease from forty-three to forty, then to thirty-five calories per day per pound by the end of his first year.

Amount of Milk Needed for Infant. — Approximately two and one-third ounces to each pound of body weight per day covers the needs of the average baby.

Fuel Value of Mother's Milk. — Each ounce of milk yields twenty calories.

The Making of Milk. — It has been estimated that for every calorie yielded by milk, two extra calories must be provided by food.

CHAPTER X

INFANT FEEDING

In taking up this part of our study on nutrition, there are several points to be kept in mind by the nurse: (1) that it will be difficult, if not impossible, to understand the metabolic changes taking place in abnormal conditions unless those occurring in the normal human body are understood; (2) that certain diseases are due directly to errors in diet; (3) that in other diseases, diet plays the chief part both in the bringing about and in the relieving of the conditions; (4) whereas there are certain other diseases not affected by diet, save in so far as well or poorly selected and prepared food always affects the individual, whether normal or abnormal, and that in the latter conditions the organism is more susceptible to bad influences.

This being the case it behooves the nurse to examine herself to find whether or not she understands the fundamental principles underlying the nutrition of the human body, that she may efficiently deal with the changes which occur more or less when the body is attacked by disease.

We include normal infant feeding in this section, because in no other age is it quite so necessary for care to be observed in formulating and carrying out a diet. Errors during this period may only appear to exert a local influence, causing disturbance which may readily be relieved, but the danger is in laying too little stress upon these disturbances, forgetting that the delicate organism of a child may be permanently injured by a constant disregard of nature's mandates. In the words of the old adage, the pitcher may go once too often to the well, and an injured digestive apparatus is even more difficult to mend than the proverbial pitcher.

In this section, then, the metabolic changes due to pathological conditions and the dietetic treatment thereof will be discussed.

The formulas suitable for the various conditions are to be found at the end of this section.

NORMAL INFANT FEEDING

Much has been written in the past few years on the care and feeding of infants and children. This is well, since statistics show an alarming increase in the rate of infant mortality during the early years of life, and anything which can be done to check this lamentable and often avoidable waste of valuable life should be resorted to with care and attention.

Food for Infants. — The natural food of all young mammals is the milk of their own mother. The rate of growth and development differs in every species; the calf, for example, doubles birth weight much more quickly than does the baby of the same age. However, the milk of the cow, which meets the needs of the calf perfectly, falls short of meeting the requirements of the infant, whose rate of growth is not nearly so rapid. For this reason if for no other, it would be advisable to give the baby its natural food rather than to attempt a substitute which is, at best, a poor one.

Weight. — The average infant weighs from six to seven pounds at birth. This weight should be doubled in the first five or six months of life and tripled by the end of the first year. The most important business, then, in the life of the child during the early years is growth and development. To achieve this properly the baby's habits must be adjusted to his needs.

Regularity in Feeding. — He must have the proper food and enough of it, and have it given at regular intervals, "by the clock," for guesswork is fatal in infant feeding. He must be given water between meals. Babies often cry from thirst when they are thought to be doing so from hunger or temper, or both. The healthy baby sleeps about twenty-two hours out of twenty-four during the early months, and even during the latter six months of the first year more time is spent in sleeping than in waking.

The Bowels. — The bowels should move several times a day, the stools being smooth and of a yellowish color, of the consistency

of pea soup. After the first month, twice a day is about the normal number of stools for the healthy baby. The infant should be placed upon a vessel held in the lap of the nurse at regular times, preferably right before the morning bath, and in the evening. In this way regularity in evacuating the bowels is obtained, and a habit formed which will prove valuable through life.

The Bath. — The daily bath is likewise necessary for the health and comfort of all babies, as is fresh air and sunshine.

As has already been stated, breast milk is much better for babies than cow's milk or any artificial food. There is something in the mother's milk which gives strength and resistance to the baby which is absolutely lacking in any other food no matter how carefully it is selected and prepared, and for this reason young mothers must be prevailed upon to nurse their babies whenever it is possible for them to do so. When circumstances, such as having to be away all day at work, make it impossible for a mother to nurse her baby at regular intervals, she can be taught how necessary are two or three breast feedings a day to the future welfare of her child. When social reasons or lack of desire on the part of the mother make her unwilling to nurse her baby, it is the part of the nurse to lay the case before her and let her judge whether or not she is willing to accept the responsibility of bringing into the world a life for which she is unwilling to provide weapons with which to fight the good fight.

Habits of Mother. — The mother must be taught how to efficiently nurse her baby; she must keep in mind that upon her good health and temperate habits depend the health and comfort of her baby. It devolves upon her to provide food efficient in quality and quantity. To do this, her own diet must be simple and wholesome. The nursing mother must remember that she has to provide, not only for her own maintenance and energy requirements, but also for the infant whose fuel requirements are ever demanding more food to provide for its rapid growth.

Food and Its Relation to Milk. — It is believed that two calories of food extra are necessary to produce one calorie of milk, and since a month-old baby requires 2½ ounces of mother's milk to every

pound of his body weight, and one ounce of mother's milk will yield 20 calories, it is clearly seen that the mother would have to increase her diet to cover the requirements of the baby. For example, if the baby weighed 12 pounds, he would require 28 ounces of milk in 24 hours, or 560 calories. Thus if it requires two calories of extra food to make one calorie of milk, the mother's diet would have to provide 1120 calories extra, or about as much food as would fulfill the needs of a laboring man, 3000 to 3500 calories, even if she were doing practically no actual work; while if she were actively employed and doing a certain amount of physical labor, her rations would have to approximate those of a man doing heavy muscular work (about 3500 to 4000 calories per day).[1]

Breast Milk versus Cow's Milk. — Consensus of opinion shows that breast-fed infants require less energy than the ones who must be nourished artificially. This is probably due largely to the fact that the constituents of human milk are in a more available form than those in cow's milk, the former requiring a lesser expenditure of energy on the part of the organism to become available than the latter. Very active babies, ones who kick and throw themselves about or cry violently, have a greater energy requirement than the more placid baby who sleeps more and is more quiet in movement and who cries less when awake. Breast-fed babies are generally more quiet than their less fortunate artificially fed brothers. It has been demonstrated that the artificially fed baby has a much harder fight for existence than the baby who receives his natural food; hence the necessity of using every available means to make the food digestible, and to lessen the danger arising from the additional work put upon the entire apparatus. Cow's milk contains practically the same chemical elements as are found in human milk, but these elements are combined in a slightly different manner, and are not so easily handled by the immature organs. The proteins of milk consist of casein, which is insoluble, and albumen, which is soluble. According to Van Slyke the proportion of insoluble to soluble protein in cow's milk

[1] "Feeding the Family," by Mary Swartz Rose.

is 3.6 : 1, while in human milk the proportion is only 1 : 1. The ash constituents in cow's milk are in excess of the needs of the infant organism, but since a great part of these salts is in an inorganic form they are not retained to the same extent as those contained in human milk, which are in an organic form.

Rules and Regulations. — It is not possible to lay down hard and fast laws to cover the subject of infant feeding. The food must be adapted to the individual needs of the baby in question. The nurse must see that the milk is obtained from a responsible dealer, certified milk being of course the safest. The bottles of milk should be wiped off carefully and placed directly on the ice as soon as they are received. The milk generally used in infant feeding has a fat content of 4 per cent. That having a higher percentage of fat is technically cream. The following table showing the fat, sugar, and protein composition of whole milk, cream, skimmed milk, and whey was arranged by Morse and Talbot:[1]

TABLE XIX

	Fat	*Milk Sugar*	*Protein*
Whole milk	4.00	4.50	3.50
7% cream	7.00	4.45	3.40
10% cream	10.00	4.40	2.25
16% cream	16.00	4.20	3.05
32% cream	32.00	3.40	2.50
Skimmed milk	1.00	5.00	3.55
Separated milk (fat free)	0.25	5.00	3.65
Whey	0.25	5.00	0.90

Seven per cent (7%) cream is obtained from the upper 16 ounces of a quart bottle of milk which has been allowed to stand undisturbed for six hours. The upper third of the bottle contains 10% fat, while the whole fat layer from the quart bottle, regardless of the number of ounces, contains about 16% of fat.

The following table by Sherman gives the composition of the whole bottle of milk with the ratio of fat to protein.

[1] "Diseases of Nutrition and Infant Feeding," p. 218, by Morse and Talbot.

TABLE XX[1]

AVERAGE COMPOSITION OF TOP MILK AFTER STANDING FROM 12 TO 24 HOURS IN A QUART BOTTLE

	Fat Per Cent	*Protein Per Cent*	*Sugar Per Cent*	*Ratio of Fat to Protein*
Upper 1 oz. . . .	22.5	2.8	4.0	8.0 : 1
Upper 2 oz. . . .	21.5	2.8	4.0	7.7 : 1
Upper 4 oz. . . .	20.0	2.8	4.0	7.1 : 1
Upper 6 oz. . . .	17.0	2.9	4.2	5.9 : 1
Upper 8 oz. . . .	14.0	3.0	4.3	4.7 : 1
Upper 10 oz. . . .	11.5	3.0	4.3	3.8 : 1
Upper 12 oz. . . .	9.8	3.1	4.5	3.2 : 1
Upper 16 oz. . . .	7.6	3.1	4.6	2.5 : 1
Upper 20 oz. . . .	6.2	3.2	4.7	1.9 : 1
Upper 24 oz. . . .	5.2	2.2	4.8	1.6 : 1
Upper 28 oz. . . .	4.5	3.3	4.8	1.4 : 1
Whole quart . . .	4.0	3.3	4.8	1.21 : 1

To utilize the above table it is only necessary to select the milk from the column containing the desired ratio of fat to protein. Suppose a baby requires a formula containing 2 per cent protein, 3.1 per cent fat, and 7 per cent sugar, to be given in eight feedings of 3 ounces each; as whole milk has a ratio of 3.1 to 2 or 1.6 to 1.0, it is obvious that a milk containing a higher percentage of fat must be selected. This is done by selecting milk from the upper ounces rather than from the whole quart. In the upper 24 ounces the ratio of fat to protein is correct, but the composition shows that there is 1.67 more fat than is needed; consequently the 24 ounces will have to be diluted 1.67 times or 24×1.67, which will bring the quantity up to 40 ounces, showing that 16 ounces of water or other diluent have been used in order to make the 24 ounces of milk available for the formula. If the fat, protein, and sugar percentages in the undiluted 24 ounces of milk are divided by 1.67, the composition of the diluted milk will be seen to be protein 1.9 per cent, fat 3.1 per cent, and sugar 2.87 per cent. After thus adjusting the fat and protein, the sugar remains to be

[1] From "Laboratory Handbook of Dietetics," by Mary Swartz Rose.

adjusted, and since the formula calls for 7 per cent sugar, the reduction of that constituent to 2.87 per cent is clearly too much. This is remedied by adding the difference, which would be 7 − 2.87 % = 4.13 per cent; — 4.13 per cent of 40 ounces equals 1.65 ounces of milk sugar or dextri-maltose which must be added. Other formulas can be figured out in a like manner.

Methods of Artificial Feeding. — The use of whole milk, top milk, or skimmed milk, diluted with water, and either milk sugar, malt sugar, or sucrose (cane sugar) added, is the method of feeding most commonly used, and upon it are based the formulas universally advised by infant specialists. There are cases in which simple dilution is not advisable. In premature or very young infants, for example, the whey mixtures have been found to give the best results. In toxic diarrheas, where the putrefactive bacteria make the use of all but the minimum amount of protein inadvisable, the above method is contraindicated, as it is likewise in cases where vomiting of casein curd is a prominent feature.[4]

The Use of Alkalies. — There are many cases in which the physician deems it advisable to add an alkali to the milk mixture. The one generally selected is limewater. However, sodium citrate and sodium bicarbonate are also used. The reasons for adding alkalies to the milk mixtures are: (1) to check the coagulation of the casein, (2) to hasten the emptying of the stomach, or (3) to chemically change the formation of the curd. In certain cases it is only necessary to delay the coagulation of the casein in the stomach, in which case a certain amount of limewater is used. Its action is to swell the protein of the milk and in this way effect the precipitation of the casein. In other cases it is found advisable to prevent the formation of curd and hasten its departure from the stomach. Cannon [5] claims that milk before it coagulates leaves the stomach quickly like water in gushes. Hence, if an alkali like limewater, bicarbonate or citrate of soda is added to the milk this coagulation will be checked and the digestion be facilitated.

[4] "Generally Accepted Methods for Artificial Feeding of Infants with Indicatives and Contra-Indicatives," by Orville R. Chadwell, M.D. Reprinted from "New England Medical Gazette," June, 1916.

[5] "Mechanical Factors of Digestion," by Cannon.

Amount and Type of Alkali Used. — The amount of alkali[6] necessary to bring about any change in the general effect of the formula must be determined by the amount of milk and cream in the mixture, since these constituents alone determine the acid content. However, it is impossible to judge exactly the amount of alkali to add, but an approximate estimate is made from the work done by the various investigators. It has been estimated that from 25 to 50 per cent of limewater must be added to milk to change it to any marked degree. In using bicarbonate of soda, a much less quantity brings about the desired result, 1½ grains of bicarbonate of soda being equal to one ounce of limewater. The action of these two alkalies is different. The soda acting upon the milk causes the curds to be more porous, and therefore more easily acted upon in digestion.

Sodium citrate likewise tends to prevent the formation of tough curds. It is added in amounts of 1 to 2 grains to each ounce of milk or cream in the mixture whenever it is found necessary to use it at all.

The addition of any alkali to the formula is resorted to if the symptoms indicate the need for it, but the type and quantity is entirely within the province of the physician, not the nurse.

The Addition of Sugar. — **Lactose** is the form in which the carbohydrates are found in all milk, and it has been a general rule to employ this sugar in making up the sugar content of a formula, using from 6 to 7 per cent of the mixture in this form to cover the necessary energy requirements of the infant. Other sugars are used, however; and of late years malt sugar has been widely employed for this purpose. The form now generally accepted is known as **dextri-maltose**, which is a combination of dextrin and maltose, both of which are readily acted upon by the sugar-splitting enzymes of the digestive juices. In digestion, lactose or milk sugar is split to dextrose and galactose and utilized in the body, both as a source of energy and as a food for the lactic acid bacteria which are active in the small intestine.

Malted Foods. — The addition of malted foods or malt sugar

[6] "Diseases of Nutrition and Infant Feeding," p. 204, by Morse and Talbot.

to the food of infants tends to bring about a more rapid gain, both in energy and in body weight, than is generally the case where other sugars are used. This sugar is used as a substitute for milk sugar in many formulas, especially in those cases in which the casein of cow's milk needs to be made more digestible in form. Malt sugar is indicated in the following conditions [7]: (1) in severe atrophies, (2) in cases of fat indigestion before the atrophic stage is reached, (3) in cases where there is slight curd indigestion, indicated by some vomiting and slow gain in weight, (4) in cases where excessive intestinal fermentation is manifested by gas and colic.

Malt sugar (dextri-maltose) is contraindicated to a slight degree in cases "of simple acute diarrhea where lactose, by supplying fermentative media, more easily restores the normal bacterial balance."

Cereal Diluents. — Barley and oatmeal water are used as diluents to the amount of one-fourth or more of the mixture. Oatmeal water or jelly is used more during the winter months than in the hot summer months. As the fat content of the oatmeal gives it a more laxative effect, it is undesirable to use it at the season in which the summer diarrheas are prevalent. Barley water has something of a colloidal action upon the casein, causing the curds to be finer and less tough in character. Both barley and oatmeal water are used in place of plain water for babies when this colloidal effect upon the curd of the milk is desired, also where the weight of the infant shows a disposition to remain stationary, especially where there are no other symptoms to account for the lack of gain. Whey is used with babies who cannot digest the insoluble protein of cow's milk. This is often the case in premature babies and is manifested by a persistent vomiting of curd. The energy requirements are obtained by the addition of cream and lactose to the whey.

Buttermilk Mixtures and "Eiweissmilch." — It is often found desirable to use some other form of milk than whole, top, or even skimmed milk, and for this purpose lactic acid, milk and the albu-

[7] "New England Medical Gazette," June, 1916. Reprint by Orville Chadwell.

men or " Eiweissmilch " are substituted. In the buttermilk mixtures the precipitation of the casein is brought about by lactic acid bacilli (Bulgarian culture). This prevents the coagulation of the casein into tough curds. Lactose buttermilk or lactic acid milk is used in the feeding of infants who have persistent green stools, and in cases of acute toxic diarrhea brought about through the action of gas bacillus.

Buttermilk is more difficult to administer to babies than formulas made from plain milk by reason of its flavor. However, the results are remarkable in the above-mentioned conditions.

" **Eiweissmilch** " is used in atrophic cases where there are bad green stools.

" **Homogenized Milk.**" — Dr. Ladd of the Children's Hospital in Boston has presented many cases of infants who showed an intolerance for butter fat. These cases he has treated with formulas containing a foreign fat, usually olive oil. This milk is subjected to a treatment which brings about a more complete emulsification of the fat than is possible in cow's milk, causing it to resemble in character the quality of the mother's milk. Homogenized milk has been used with success in cases where it was impossible to supply the infant with breast milk.

Technique of Milk Modification. — The absolute necessity for cleanliness has already been dwelt upon in respect to milk, and in infant feeding the vigilance which must be observed in the preparation of the food cannot be too strongly emphasized. The milk itself must be of known purity. Where there is any uncertainty about its source, it must be sterilized or pasteurized according to the doctor's orders. The bottles and nipples should be washed as soon as they are used, first with plain water to remove the milk, then with soapsuds and a bottle brush. The bottles should then be filled with boric acid or bicarbonate of soda solution until needed, when they should be emptied and placed in a deep pan filled with cold water and allowed to boil for a few minutes. They should not be taken from the water until they are to be filled with the milk mixture. The nipples are washed thoroughly and boiled once a day and dropped into a solution of boric acid or

bicarbonate of soda when not in use. The plain black rubber nipples are best as they can easily be turned inside out and cleaned. If the milk drops too slowly from the bottle, the nipple may be pierced in one or two places with a darning needle.

The morning is the best time in which to prepare the baby's food; the milk has not stood too long and it is easier to regulate the feedings if a fresh start is made each morning. Let the bottles and the rubber corks with which they must be stopped be boiled and cooled while the milk mixture is being prepared.

Preparation of Diluents. — If barley or oatmeal water is to be used as a diluent, let that be prepared first, that it may be cool before adding it to the milk. Cover the table with a clean cloth or oilcloth, upon this place the pitcher in which the milk is to be modified, have the funnel, milk dipper, and spoon which are to be used boiled with the bottles, cover the mouth of the pitcher with a clean square of gauze or cheesecloth; read the formula carefully and measure the sugar, dextri-maltose, lactose, Mellin's Food, or cane sugar as directed and place it in a clean glass; now measure the diluent, water, oatmeal water, barley water, or whey; use part of this diluent to dissolve the sugar.

Measuring Milk according to Percentage of Fat. — Now dip off the required layer of top milk, that is, the layer containing the desired percentage of fat and protein. Mix this thoroughly and dip out the requisite number of ounces into the pitcher. If there is not sufficient cream in one quart bottle to fill the formula, the cream must be dipped from a second bottle and mixed with that of the first before it is measured into the pitcher. The dissolved sugar and rest of the diluent, together with the correct amount of limewater, are strained into the pitcher, mixed thoroughly, and strained through the absorbent cotton lining the funnel into the bottles, allowing the correct number of ounces for each feeding in every bottle.

Pasteurizing the Milk. — The corks are then adjusted, the bottles placed in the pastuerizer [8] and pasteurized for the desired

[8] There are a number of pasteurizers on the market; one sold by the Walker Gordon Laboratory and one designed by Dr. R. G. Freeman of New York are both satisfactory.

number of minutes. The water in the pasteurizer must be cold in the beginning and the rise of temperature recorded on the thermometer, which is adjusted at a convenient place in the pasteurizer where the scale can be read easily. If the temperature of the water is too high, add cold water and lower the flame beneath the pasteurizer. When the desired number of minutes has elapsed, lift the bottle rack above the water for a few minutes and allow a stream of cold water to flow into the pasteurizer, taking care not to chill the bottles too suddenly or they will crack. Cool the bottles as quickly as possible and place on ice until needed, warming the bottle of milk as needed in warm water.

SELECTED FORMULAS

The following formulas, adapted from Holt's "Care and Feeding of Children," may prove of use in the feeding of normal babies:

1. **Series; Fat to Protein 3 : 1.**

Primary Formula, 10% milk, fat 10%, sugar 4.3%, protein 3.3% obtained (1) as upper third of quart bottle or (2) equal parts 16% cream and milk.

Derived Formulas, giving quantities in 20-ounce mixture: milk sugar 1 ounce, limewater 1 ounce, water sufficient quantity added to make 20 ounces.

	Fat Per Cent	*Sugar Per Cent*	*Protein Per Cent*
1. With 2 oz. 10% milk . .	1.00	5.50	0.33
2. With 3 oz. 10% milk . .	1.50	5.50	0.50
3. With 4 oz. 10% milk . .	2.00	6.00	0.66
4. With 5 oz. 10% milk . .	2.50	6.00	0.83
5. With 6 oz. 10% milk . .	3.00	6.00	1.00
6. With 7 oz. 10% milk . .	3.50	6.50	1.16

In each formula the proportion of fat to protein is 3 : 1, the sugar 1 ounce in 20 or 1 tbs. in 8 ounces gives 5.5% for lower for-

mulas and 6.5% for higher formulas; sufficient water is added to bring the mixture up to the desired number of ounces.

2. **Series; Fat to Protein 2:1.**

Primary Formula, 7% milk, fat 7%, sugar 4.4%, protein 3.5% obtained (1) from upper half of quart bottle of milk or (2) by using three parts milk and one part 16% cream.

Derived Formulas, giving quantities for a 20-ounce mixture: milk sugar 1 ounce, limewater 1 ounce, water sufficient quantity added to make 20 ounces.

	Fat Per Cent	*Sugar Per Cent*	*Protein Per Cent*
1. With 3 oz. 7% milk . .	1.00	5.50	0.50
2. With 4 oz. 7% milk . .	1.40	5.75	0.70
3. With 5 oz. 7% milk . .	1.75	6.00	0.87
4. With 6 oz. 7% milk . .	2.10	6.00	1.05
5. With 7 oz. 7% milk . .	2.50	6.50	1.25
6. With 8 oz. 7% milk . .	2.80	6.50	1.40
7. With 9 oz. 7% milk . .	3.15	7.00	1.55
8. With 10 oz. 7% milk . .	3.50	7.00	1.75
9. With 12 oz. 7% milk . .	4.00	7.00	2.00

The exact fat per cent is obtained by taking one-third of the number of ounces of top milk in a 20-ounce mixture and adding 0.15 to result. There may be a slight variation but the amount is too slight to make any appreciable difference. The percentage of protein in each case is one-half the fat. The amount of sugar used is one ounce in twenty until the food is half milk; then one in twenty-five or one tablespoonful to each ten ounces will give the correct amount. One ounce of limewater is allowed to the entire twenty ounces of food and water or other diluent.

3. **Series; Fat to Protein 8:7.**

Primary Formula, plain milk, fat 5%, sugar 4.5%, protein 3%.

Derived Formulas, giving quantities for 20-ounce mixture: milk sugar 1 oz., limewater 1 oz., water of sufficient quantity added to make 20 ounces:

	Fat Per Cent	*Sugar Per Cent*	*Protein Per Cent*
1. With 5 oz. plain milk .	1.00	6.00	0.87
2. With 6 oz. plain milk .	1.20	6.00	1.00
3. With 8 oz. plain milk .	1.60	6.50	1.40
4. With 10 oz. plain milk .	2.00	7.00	1.75

Milk sugar ½ oz., limewater ½ oz., water of sufficient quantity added to make 20 ounces:

	Fat	*Sugar*	*Protein*
5. With 12 oz. plain milk .	2.40	5.00	2.10
6. With 14 oz. plain milk .	2.80	5.50	2.50
7. With 16 oz. plain milk .	3.20	5.50	2.80

Changing the Formula. — It is often found necessary to change the formula when using artificial feeding for infants, and under these circumstances it is necessary to know the percentages of the food constituents contained in the formula already in use. For this purpose the following method, quoted from "Diseases of Nutrition and Infant Feeding," [9] is included:

Morse and Talbot's Method. — Suppose that a baby is taking a food made up of —

Gravity cream	12 ounces
Skimmed milk	18 ounces
Limewater	6 ounces
Barley water	12 ounces
Milk sugar	4 rounded tablespoonfuls

"The barley water is made with two teaspoonfuls of barley flour in a pint of water. The total quantity of the mixture is 48 ounces. Gravity cream contains 16% fat. Twelve ounces of gravity cream in a 48-ounce mixture will give, therefore, $\frac{12}{48}$ of 16% of fat, or 4% fat. Both gravity cream and skimmed milk

[9] "Diseases of Nutrition and Infant Feeding," pp. 225 and 226, by Morse and Talbot.

cóntain 3.20% protein. There are 30 ounces of gravity cream and skimmed milk in the mixture; 30 ounces in a 48-ounce mixture will give $\frac{30}{48}$ of 3.20% of protein, or 2.00% of protein. Both gravity cream and skimmed milk also contain 4.50% of sugar. Thirty ounces of gravity cream and skimmed milk in a 48-ounce mixture will therefore furnish $\frac{30}{48}$ of $4\frac{1}{2}$ which is the same as $\frac{30}{48}$ of $\frac{9}{2}$ or almost 3.00% of milk sugar. Four rounded tablespoonfuls of milk sugar are equal to two ounces. Two ounces of sugar in a 48-ounce mixture is equal to $\frac{2}{48}$ of 100% or 4%. The total percentage of sugar is, therefore, 7%. Two teaspoonfuls of barley flour in a pint of water makes a 1.50% decoction of starch. Twelve ounces of barley water of this strength in a 48-ounce mixture will give $\frac{12}{48}$ of 1.50% or about 0.35% starch. There are six ounces of limewater in the mixture and 30 ounces of gravity cream and skimmed milk. $\frac{6}{30}$ of 100% is 20%. The limewater is, therefore, 20% of the milk and cream. The mixture thus contains 4% fat, 7% sugar, 2% protein, and 0.35% starch, while the limewater is in the proportion of 20% of the cream and milk."

If, therefore, the nurse will follow out the plan suggested by Drs. Morse and Talbot, it should be a simple matter to change the percentage of any of the food constituents in any formula.

Computing the Fuel Value. — In computing the fuel values of a formula, it is necessary to know the number of grams of each chemical combination in the mixture and multiply these by their fuel factors. To find if the formula is not furnishing the requisite number of calories to cover the energy and nitrogen requirements, it is necessary only to turn to the table showing the requirements for the different ages to gain some idea as to how far the formula is conforming to the average requirements. It must be understood that it is impossible to lay down a hard and fast law in making the formulas. Each infant has slightly different requirements. One may be strong and active, expending much energy, while another not so robust nor so active uses his energy for storage purposes. The first youngster's energy requirements are necessarily greater than those of the more phlegmatic baby, since the one uses his energy for physical activities while the other

stores it up. The nervous, highly-strung baby who cries much and sleeps little has an energy requirement in excess of that of the baby who is quiet when awake and who sleeps the greater part of the twenty-four hours. The following scheme [10] is suggested, using whole milk as a basis for the feeding of normal babies during the first year.

Administration of Water. — Water is given every four hours during the first day in quantities of from one to two ounces. On the second to fourth days three ounces of milk, seven ounces of water, two teaspoonfuls of milk sugar or dextri-maltose is divided into seven feedings. On the fifth to seventh days, four ounces of milk, eight ounces of water, three teaspoonfuls of milk sugar, divided into seven feedings. Eighth day to end of third month: beginning with five ounces of milk, ten ounces of water, and one and one-half tablespoonfuls of milk sugar, increase the milk one-half ounce every four days, the water one-half ounce every eight days, the milk sugar by one-half tablespoonful every two weeks. On the sixteenth day the formula requires six ounces of milk, ten and one-half ounces of water, and two tablespoonfuls of milk sugar divided into seven feedings. On the twentieth day the formula is changed to six and one-half ounces of milk, the water and sugar increased in proportion, making six and one-half ounces of milk, ten and one-half ounces of water, and two tablespoonfuls of milk sugar or dextri-maltose. At this rate of increase, the infant receives by the end of the third month approximately sixteen ounces of milk, sixteen ounces of water, and four and one-half tablespoonfuls of milk sugar, which is divided into six instead of seven feedings.

Strengthening the Formula. — The increase of milk is made at the rate of one-half ounce every six days, while the sugar remains stationary at four and one-half tablespoonfuls each day and the amount of the water is decreased at the rate of one-half ounce every two weeks.[11]

[10] Adapted from "Save the Babies," by Holt and Shaw.

[11] If food does not digest or if the stools are found to contain undigested curds, ½ teaspoonful of barley flour may be cooked in the water for 20 minutes, the amount of water lost by evaporation being added to cool the mixture.

By the end of the sixth month the baby is receiving twenty-four ounces of milk, twelve ounces of water, and four and one-half tablespoonfuls of milk sugar, divided into five feedings. The increase of one-half ounce of milk is now made every week, while the water is reduced one-half ounce every two weeks and the milk sugar to three tablespoonfuls each day.

Orange Juice. — During the seventh month to the end of the ninth month from one to two tablespoonfuls of strained orange juice may be given midway between the two morning feedings. This is introduced to keep the bowels in good condition, and to act as a preventive measure against scurvy, which may develop if pasteurized milk is used exclusively. Barley flour may likewise be used at this time, beginning with 1½ tablespoonfuls (¾ of an ounce) and increasing to 3 tablespoonfuls. This is boiled in the water which forms part of the formula for the day.

Tenth Month to End of Twelfth Month. — At the end of the ninth month the baby is receiving approximately 30 ounces of milk, 8 ounces of water cooked with 3 tablespoonfuls of barley flour, and 3 tablespoonfuls of milk sugar divided into 5 feedings. The orange juice is continued as directed. The milk is now increased one ounce per month and the sugar decreased one tablespoonful per month. The 3 tablespoonfuls of barley flour are cooked in 8 ounces of water and added, and the orange juice may be increased to 3 tablespoonfuls unless the bowels are already loose. After one feeding of milk is given, the soft-cooked yolk of an egg [12] may be fed or a small piece of stale bread crust may be given the baby to chew. According to Holt and Shaw, no other food must be given during the first year. Other authorities, however, include strained cereals, oatmeal, cream of wheat, rice, or farina during the last three months of the first year.

Adding Semi-solids to Diet. — At fourteen months the baby may have milk-toast, using part of its milk for this purpose; a part of the milk may likewise be made into junket. Prune pulp

[12] Morse and Talbot advise the giving of eggs to be deferred until the baby is 18 months old, giving one egg every other day unless it disagrees, increasing this to one egg a day by the time the child is 2 years old.

and juice and the soft part of a well-baked apple may be given at this time.

Many specialists in the feeding of infants begin the feeding of more solid foods at the early age of six months and continue to the ninth month, at this time giving the following scheme of feeding as a guide:

Scheme for Adding Solids to Infants' Diet. —

From 9th to 15th month:

6 A.M. — Milk formula (bottle).
8 A.M. — Orange juice ½ ounce, or prune pulp or prune juice.
10 A.M. — Bottle, cereal (strained) and bread and butter or zwieback.
2 P.M. — Mutton, chicken, or veal soup cooked with cereal; small portion of baked potato, small portion of strained spinach or carrots; orange gelatine or cornstarch pudding.
6 P.M. — Bottle.

From 15 months to 2½ years:

8 A.M. — Stewed fruit or orange juice; cereal; crisp bacon, alternate with soft-cooked or poached egg; bread and butter or toast, milk or weak cocoa.
12 or 1 P.M. — Meat or vegetable soup thickened with cereal; lamb chop, scraped beef or chicken or beef juice; baked or mashed potato; strained spinach; carrots; turnips or celery; gelatine, custard, or cornstarch pudding.
3 P.M. — Crackers and milk.
6 or 7 P.M. — Bread and milk or cereal; baked apple or apple sauce.

From 3 to 6 years:

8 A.M. — Stewed fruit or orange; cereal; bacon or egg (soft-cooked or poached); bread and butter; milk or cocoa.

12 M. — Soup; lamb chop, scraped beef, chicken, or roast meats; potato; all vegetables; celery, lettuce; light desserts: custards, gelatine, lady fingers.

3 P.M. — Milk; fruit and crackers.

6 P.M. — Milk or cocoa; stewed fruit; bread and butter; cereals; eggs.

Morse and Talbot advise baked potato, plain boiled macaroni, rice and wheat germ, bread and butter, baked custard, plain blancmange, and plain boiled tapioca to be given when the child is 1½ years old. When the child is nearly two years old they add meat in the most digestible forms, such as the white meat of chicken, lamb or mutton chops, and scraped beef.

The following dietary is suggested for a child two years old:[13]

"Whole milk, butter, mutton broth, chicken broth, beef juice, soft-cooked eggs, dropped eggs, white meat of chicken, lamb or mutton chops, scraped beef, French bread, stale bread, toasted bread, whole wheat bread, milk toast, zwieback, plain white crackers, plain Educator crackers, barley jelly, oatmeal, cream of wheat, wheat germ, Ralston's Farina, rice, baked potato, plain boiled macaroni, orange juice, baked apples, stewed prune pulp and juice, junket, baked custard, cornstarch pudding, plain blancmange, plain tapioca. It is not advisable, as a rule, to begin green vegetables until the baby is 2½ years old."

It will be seen in the foregoing dietaries how authorities differ in their beliefs as to the requirements of the child. The dietaries included in this text are selected from those used in different parts of the country by physicians who have successfully cared for the infants and children under their charge.

THE FEEDING OF PREMATURE INFANTS

The digestion of premature infants is naturally not as strong as that of infants born at term. Very little is positively known, but the consensus of opinion goes to show that in the majority of cases the tolerance for sugar is greater than that of either the pro-

[13] "Diseases of Nutrition and Infant Feeding," p. 236, by Morse and Talbot.

teins or fats. The loss of heat is relatively greater in proportion to its surface area in small than in large bodies. This is a well-known fact, hence the premature baby must require more food in proportion to its weight than the baby who is born at the normal time. Then, too, as the premature infant is thinner he does not keep warm like the older infant, and this must be taken into consideration in feeding him. Breast milk is of course by far the best food for such babies, not only because its constituents are in a more available form for the feeble digestive organs, but because the mother's milk furnishes a resistance which is lacking in even the most carefully modified of milk formulas.

Energy Requirements of Premature Infants. — Experiments made upon premature infants have proved that the caloric needs of these babies are greater than in the case of full-time babies; that is, they require more per kilogram of body weight. According to Morse [14] most premature babies need 120 calories per kilogram of body weight. But there are many exceptions, some thriving on as little as 70 calories per kilogram. "No attempt should be made to reach 120 calories per kilogram during the first few days. Thirty calories per kilogram is as much as is wise to give in the first 24 hours of feeding. This amount should be gradually increased each day, watching carefully for symptoms of indigestion and diminishing it if these appear. One hundred and twenty calories per kilogram can be given in about 10 days." [15]

Necessary Dilution. — Even breast milk must be diluted with an equal amount of water or a 3% sugar solution. The amount of milk should be increased and the amount of dilution decreased until the undiluted breast milk is given in four or five days. Like older babies, the next best food for premature babies is the properly modified cow's milk, but exceeding care will have to be observed, as these babies are more easily upset than older and stronger ones.

Premature Infant Feeding. — The following method of feeding may be suggested, keeping in mind that it is an easy matter to

[14] Morse: "American Journal of Obstetrics," 1905. Hess: "American Journal Diseases of Children," 1911.

[15] "Diseases of Nutrition and Infant Feeding," p. 238, by Morse and Talbot.

increase the strength of a mixture if the baby shows the need of such an increase. The premature baby is rarely strong enough to take the breast.

Method of Administering Milk. — The most satisfactory method of administering the food in such cases is by means of the Brick feeder, which consists of a graduated glass tube, open at either end. On the small end is placed a small nipple like those seen on medicine droppers; this one is perforated and goes into the mouth of the baby. A large rubber finger cot is attached to the other end of the tube. The milk is forced into the mouth by pressing the finger cot. In case the infant is too feeble even for this method of feeding, the desired amount is dropped into the mouth from a medicine dropper; 5 c.c. (about 1 dram or 1 teaspoonful) of diluted milk being given at each feeding. This amount is increased gradually from day to day.

Whey Mixtures. — Whey mixtures have been found to meet the needs of premature infants more efficiently than ordinary mixtures. As the proteins in whey are in a more digestible form, they throw less work on the immature digestive apparatus. As a rule the casein and whey are in proportion of 1 : 1.

The following formulas[16] show the amounts in which the food constituents are combined and are suitable for premature babies:

Fat	1.00%
Milk sugar	4.00%
Total proteins	0.25%
Limewater	25% of cream and milk mixture

or

Fat	1.00%
Milk sugar	4.50%
Total proteins	0.50%
Limewater	25% of cream and milk mixture

PROPRIETARY FOODS

A word as to the use of Proprietary Infant Foods: These prepared foods may be classified under four heads, as follows: (1) con-

[16] "Diseases of Nutrition and Infant Feeding," p. 239, by Morse and Talbot.

densed milks; (2) malted foods, those consisting chiefly of carbohydrates in the form of maltose and dextrins; (3) those consisting almost entirely of starch, and (4) those composed partly of soluble and partly of insoluble carbohydrates.

(1) Condensed milk may be sweetened or unsweetened. These milks are never given undiluted, the directions calling for one part condensed milk to nine parts water, which gives a mixture containing 0.90% fat, 5.49% sugar, and 0.80% protein if "Eagle Brand" Condensed Milk is used.[17]

(2) Malted Foods: Mellin's Food and malted milk are examples of this group. These foods contain the carbohydrates in soluble form and when added to milk make an acceptable addition, as they furnish the carbohydrates in the most digestible form. When fed alone, diluted only with water, they result in a mixture deficient in both fat and protein.

(3) Imperial Granum is an example of this group, and there are several others with similar compositions. These foods are very much like wheat flour which has been subjected to heat, changing to a small extent the starch to dextrose and dextrin.

(4) Nestlé's Food, Eskay's Albumenized Food, and Allenbury's Food are examples of this group, each containing sugar and a percentage of starch. Upon dilution with water, the amount of fat in the mixture is just a trace.

Incomplete Foods as a Source of Danger. — The ease with which the majority of these foods are prepared and the way in which they agree with the baby constitute the chief danger of their use. If they are added to milk, with the exception of the condensed milks, they result in a modified milk containing the carbohydrates in a more or less digested form. But they are expensive, and give no better result as a rule than a carefully modified milk containing a cereal gruel.

The giving of foods like malted milk alone is dangerous because they are deficient in some of the most necessary constituents, and babies fed in this way, while growing fat, are apt to have soft or brittle bones and muscular tissue higher in fat and water than in

[17] "Diseases of Nutrition and Infant Feeding," by Morse and Talbot.

protein, so that they do not grow and develop in a normal way, and when they are attacked by the diseases so prevalent in the early years of life, they succumb rapidly, because the resistance given by a properly modified food is lacking.

Condensed milks act in a like manner. That is, in the sweetened milks the carbohydrate content is far in excess of the needs, and the proteins and fats are deficient, so that while the baby fattens he does not receive the building foods commensurate with his body requirements.[18]

Many mothers adopt the use of these foods because they mean less work than in modifying the milk properly, but the nurse should point out the facts just mentioned, explaining that while these proprietary infant foods are undoubtedly valuable at times to fill a place when the milk formula has not proved satisfactory, the use of these foods as a regular custom is expensive, not only from a financial standpoint but from a standpoint of health, since their disadvantages far outweigh their advantages in the long run.

SUMMARY

Breast Milk as a Food. — The superiority of breast milk over any other known food cannot be too strongly emphasized.

Regularity in Feeding. — The absolute need for regularity in feeding — " feeding by the clock " and not by guess or when the baby cries.

Indications of Health. — The normal growth and development to be used as guides as to the physical well-being of the infant; also as an indication of the use of the proper modification of milk for the individual needs of the child.

Dilution. — The amount of dilution necessary — cereal waters, whey, etc. — to increase the digestibility and nutrient values of the formula.

The Addition of Alkali. — The addition of alkalies to milk formulas to accomplish a like purpose.

[18] The proprietary foods on the market are many, but those given above as suggested by Morse and Talbot represent the best known infant foods.

Milk Sugar, Malt Sugar, Cane Sugar. — The use of the different sugars, namely, dextri-maltose, lactose, or cane sugar under various circumstances as the condition of the infant demands.

Substitutes for Whole Milk. — The substitution of different milks, such as lactic acid milk, Bulgarian culture buttermilk, Eiweissmilch, cream and whey mixtures, as the individual needs of the infant demand.

Technique of Milk Modifications. — The absolute need for the nurse to understand the technique of milk modification before attempting the care of an artificially fed infant.

Percentage Computation. — A knowledge of percentage, that an accurate computation of a formula may be accomplished.

Preparation of Food. — A sufficient knowledge of food preparation to enable the nurse to prepare any food which may be deemed necessary by the physician for the welfare of the child.

Water. — The importance of giving the baby water aside from that used in modifying the milk. Many babies cry from thirst when they are believed to be crying from hunger or temper.

Increasing the Diet. — The necessity for increasing the amount and strength of the formula with the age, growth, and development of the child by the addition of solid food as soon as the physician deems it advisable.

Feeding Premature Infants. — The method of feeding a premature infant differs from that employed in feeding an infant born at term: (*a*) because its development has not progressed so far; (*b*) because its digestive apparatus being more or less immature, food handled with ease by an older baby will be totally unfit for the premature one, both as to quality and quantity.

Wet Nurse. — The advisability of procuring a wet nurse when the mother is unable to nurse the infant, (*a*) on account of the more digestible character of the food constituents, especially the proteins, in mother's milk over those of cow's milk; (*b*) on account of the resistance furnished by the natural food which has been proved to be very much greater than that furnished by any other food, no matter how carefully the modification of the milk is made.

Premature Infants. — Their caloric needs are greater than in full-term babies, hence their food must be adjusted to meet these needs.

In fact the nurse must have an understanding of the behavior of foods in the metabolism of infancy and the laws which govern their use in the organism of the child.

CHAPTER XI

CARE AND FEEDING OF INFANTS AND CHILDREN IN ABNORMAL CONDITIONS

Digestive Disturbances. — It is a well-established fact that artificially fed infants are more subject to disturbances due to diet than breast-fed infants, the digestional disturbances of the latter yielding more readily to treatment. As a rule, with the breast-fed baby it is largely a question of adjusting the diet of the mother, of increasing the fluid in her diet, of seeing that she takes the requisite amount of exercise in the open air, and of lengthening the intervals between feedings or of giving the baby water just before putting him to the breast. With the artificially fed infant it is an entirely different proposition.

Causes in Artificially Fed Infants. — The digestive disturbances may arise from any one of half a dozen or more causes. The constituents in the milk may be in the wrong proportion. The amount given at a feeding may be too great or too little. The dilution may be too great or too small to meet the needs of the infant. Or the milk may contain the microörganisms which bring about fermentation or putrefaction. Any or all of these causes may assail the artificially fed baby. Consequently, all the care that can be exercised must be resorted to in the feeding of these babies, not only after digestional disturbances arise, but as a means of their prevention. In the preceding chapter the methods generally used in the feeding of normal infants were discussed. We now proceed to the feeding under abnormal or pathological conditions.

Errors in Diet. — The majority of the ills from which the baby suffers can be traced primarily to errors in diet and in most of these cases the treatment consists chiefly in adjusting the formula

to suit the condition. As a rule, these errors may be placed under two heads: those that are brought on by underfeeding and those induced by overfeeding. The pathological conditions arising from underfeeding are due not only to a lack of food, but chiefly to the improper balancing of the different food constituents in the formula. As has already been stated, so much food is required to cover the energy expenditures, so much for maintenance, and so much for storage for the growth and development necessary during the entire period from birth to maturity. These constituents must be regulated to the individual needs of the infant.

Over- and Under-dilution. — If the dilution is too great, the infant, while receiving the correct amount of the mixture, may have the necessary food constituents so reduced as to have them fail completely to do their appointed work in the body. Or if the amount of diluent is too small the baby may be receiving too strong a mixture, and develop nutritional disturbances therefrom. Under the first head the child suffers from underfeeding; the appetite is satisfied before enough of the actual food is ingested to meet his various needs. However, it is probable that the artificially fed infant suffers from the results of over-, rather than of underfeeding.

DISEASES DUE TO ERRORS IN DIET

Gastro-intestinal disturbances, colic, enterocolitis, colitis, etc., rickets, scurvy, nephritis, and diabetes are among the diseases most apt to develop from injudicious feeding, and in these cases the dietetic treatment plays the most important part in combating the condition. The disturbances caused by food are recognized by the general symptoms: vomiting, rise of temperature, subnormal temperature, and the stools, the latter being the chief point of observation.

Fats as Cause. — When the fats are causing the disturbance, the rise of temperature is apt to be high, but not of long duration. The baby vomits frequently, the vomitus being acid in reaction and odor, the latter due to the presence of fatty acids, butyric acid, etc. Diarrhea often develops in a more or less acute form.

In these cases there is a loss of sodium and other alkaline salts in the feces, and a consequent excess of ammonia in the urine, resulting in acidosis. Acid intoxication has been known to develop as a result of this loss of alkaline salts. The chief symptoms of this condition are rapid and deep respiration, stupor or restlessness, and cherry-red lips.[1]

Symptoms of Excess Fat in Diets. — The general symptoms in infants receiving an excess of fat in their food take the form of loss of appetite, with more or less loss of weight, or failure to gain. When the cases are not chronic, soft curds may often be seen, which are at times mistaken for casein curds, but may be distinguished from them by their translucent appearance and their solubility in ether. The color of the stools due to the excess of fat under the above-mentioned conditions is shiny and gray. In the majority of cases, especially of a more chronic character, the stools are apt to be large and dry, at times hard and crumbly. The fat in such stools is combined with magnesium and calcium salts, forming the characteristic "soap stools."[2] The combined loss of these salts in the feces has a definite effect on the general metabolism and nutrition, giving rise to rickets.

Regulating the Fat. — The treatment consists chiefly of regulating the amount of fat in the formula, and of cutting it out altogether in the beginning when the symptoms show acute acid conditions. In many cases, if the baby is given breast milk, the trouble disappears. At other times it is necessary to substitute a foreign fat such as olive oil for the butter fat. Dr. Ladd in the Children's Hospital in Boston treated many babies who manifested an intolerance for butter fat with "Homogenized Milk," which consisted of skimmed or separated milk and a certain percentage of olive oil, placed in an apparatus which brought about a more complete division of the fat, causing it to mix with the milk as an emulsion closely resembling human milk.

Fat intolerance is most difficult to overcome, the baby being apt to relapse into the acute stage unless the utmost caution is observed

[1] "Diseases of Nutrition and Infant Feeding," by Morse and Talbot.
[2] *Ibid.*

in adding the fats to the formula. It is not safe, however, to feed the baby upon a fat-free milk for any great length of time.

Excess Protein in Food. — The digestional disturbances arising from too much protein in the food are as a rule readily overcome in breast-fed infants. When it is due to nervousness or worry in the mother, it disappears as soon as the mother ceases to worry or does something to remove the cause of the nervous condition. When the breast milk is high in protein, more exercise in the open air at times adjusts the percentage of protein, providing the mother does not become over-tired, in which case the percentage of protein in breast milk increases.

Evidences of Excess Protein. — The symptoms of excess protein in the diet of the breast-fed baby are colic and flatulence, which are often persistent and difficult to overcome. Vomiting is not so common in these babies as in those who are artificially fed. The stools are increased in number, are either brown or green, and generally loose and watery. In artificially fed infants the symptoms are much the same, except that the vomitus often contains large curds which are tough and leathery. The baby suffers from gas formation and colic. The stools are at times normal, except for the presence of large, hard curds; at other times they are increased in number, and are of a watery consistency and alkaline in reaction.

Regulating the Protein in Formula. — When the stools are watery and brown and musty in odor as the result of disturbed protein digestion, the treatment consists of taking out the proteins from the formula and of substituting cereal water, to which dextrimaltose or milk sugar is added, the milk being added as soon as possible to prevent too great a loss of body protein. As a rule the whey proteins do not cause the disturbances so often as the casein proteins; and at times it is possible to use whey mixtures with babies who cannot tolerate the casein at all.

Buttermilk also is used in cases of protein indigestion, as is Eiweissmilch and peptonized milk.

Regulating the Carbohydrates. — When the disturbances are due to the carbohydrates in the formula, they may be digestional

or nutritional. In this form the milk sugar is more apt to be the cause of the trouble than the dextri-maltose preparations which are at times used. In the latter, when the disturbance becomes nutritional, the cause of the trouble can usually be traced to an excess of starch. When the percentage of milk sugar is greater than can be handled by the digestive apparatus of the baby, it is manifested by frequent attacks of colic, with the passage of watery green stools, highly irritating in character on account of their acidity. In acute cases the loss of weight is often marked, and symptoms of intoxication may develop. The outlook is grave in the very severe cases, but if the baby can survive forty-eight hours after the acute symptoms develop, he is apt to pull through the attack.

Adjusting the Sugars. — The treatment in these conditions consists of eliminating the milk sugar from the formula; in less severe cases dextri-maltose may be substituted. As a rule, coincident with indigestion caused by sugar there will be found to be an intolerance for much fat, so that this must be adjusted as well as the milk sugar. Skimmed milk mixtures, containing a certain amount of barley or oatmeal water, are generally found to be suitable in these cases. Dextri-maltose may be added after a few days in order to maintain the fuel needs of the body. Eiweissmilch is at times used, but whey mixtures are contraindicated on account of their high sugar content.

Dextri-maltose also disagrees at times. The baby has colic and flatulence, the stools are usually loose or watery and dark brown in color. The dietetic treatment consists of an immediate withdrawal of the dextri-maltose preparation and a substitution of milk sugar after a few days.

Evidences of Excess Starch in Formula. — The disturbances arising from an excess of starch in the diet are, as has already been stated, more apt to be of a chronic than an acute character. Vomiting is not a common symptom under these conditions, although colic is frequent. The stools are at times loose and brown, at other times dry and small. The baby at times suffers from diarrhea and at others from constipation. When the dis-

turbance is acute the starch must be entirely eliminated from the formula. If proprietary foods are being used containing starch, whether it is dextrinized or unchanged, they must be at once abandoned, and a formula made up of protein with sugar and fat.

MODIFIED MILK FORMULAS SUGGESTED BY MORSE AND TALBOT FOR THESE CONDITIONS

Fat	1.00%		Fat	2.00%
Milk sugar	4.00%	or	Milk sugar	5.00%
Protein	0.75%		Protein	1.25%

They likewise advise whey and whey mixtures under these circumstances.

Fermentation. — Fermentation is often the cause of infantile indigestion. At times it is acute and may cause a decided elevation of temperature owing to the absorption of the toxic substances formed as a result of the bacterial action. In almost every case of indigestion brought on by fermentation there will be an accompanying diarrhea. As a rule the carbohydrates are more liable to the attacks of bacteria in the stomach than the other food constituents.

Treatment. — The treatment consists first of starvation, no food being given for at least twenty-four hours. Then water or weak tea, sweetened with saccharine, may be given, but nothing else. The medical treatment must be left to the discretion of the physician. When the condition warrants a return to food the formula must be made weaker than that which has caused the disturbance. Malt soup mixtures, buttermilk mixtures, whey and albumen water may be added as the condition of the baby improves. In older children the period of starvation may have to exceed that of infants, but a gradual return to normal diet is made. Weak tea and toast may be given after the first twenty-four hours and well skimmed meat broths, soft-cooked eggs, liquid peptonoids, and malted milk added to the diet as the condition of the child improves.

ENTEROCOLITIS

The dietetic treatment for enterocolitis must be adjusted according to the principal symptom. In some of these cases diarrhea is most prominent, while in others constipation is the most marked symptom. Hence the diet must be such as not only to do no harm to the child, but one that will aid in his ultimate recovery.

DIARRHEA

The treatment for diarrhea, whether it is from fermentation or putrefaction of food, has already been explained. The grave danger in the putrefactive diarrhea is the absorption of the toxic substances which result from bacterial action upon the unabsorbed food material in the small and large intestine. In these cases auto-intoxication may develop and the baby may die before the condition yields to treatment. The entire intestine must be cleansed as a rule. The stomach of the baby may be reached with little trouble by using a small rubber catheter attached to a glass funnel and a solution of bicarbonate of soda. The bowels may be emptied by means of a soapsuds enema. Older children may be given oil, but this of course comes under the jurisdiction of the physician.

CONSTIPATION

Constipation is one of the most frequent troubles visited upon people of all ages. "It is not a disease, it is a condition in which the number of stools is less or the consistency of the stools is greater than is normal for the individual at the given time." [3] It may be caused by neglect of the bowels, which should be evacuated once or twice every day during infancy and once a day after that period. If the habit of emptying the bowels every day is established in infancy it adds much to the health and comfort of the individual during the entire remainder of life. Babies are sometimes constipated as the result of the opium administered in soothing sirups.

[3] "Diseases of Nutrition and Infant Feeding," p. 307, by Morse and Talbot.

Others inherit constipation, while still others are constipated by the taking of the wrong kind of food or too little food. In any case it is decidedly bad to resort to drugs, since the habit of taking cathartics is so easily acquired and so difficult to overcome.

Factors Inducing Constipation. — With artificially fed babies a formula which contains too high a percentage of diluent and too low a percentage of solids will cause constipation, chiefly because the solids are so completely absorbed that they have no residue to form feces. A formula with too low a fat content in proportion to its protein and carbohydrates may cause constipation because the latter two constituents are almost entirely absorbed, and the feces, which is largely made up of the fat, is correspondingly small. Excess of fat, however, has been proved to be one of the chief causes of constipation in infants, as has also been the case with excess starch. Boiling the milk for the baby at times results in constipation. Hence sterilization is more frequently to blame for the condition than the pasteurization of milk.

Constipation during Second Year. — During the second year, if the child is given too much milk and too little solid food, constipation is very apt to be the result. A maximum quantity of from thirty-two to forty ounces may be given. In many diseases brought on by malnutrition, constipation is an obstinate condition to be overcome. This is especially the case in rickets and anemia.

Use of Laxative Foods. — After the baby is a few months old, orange juice is given between the morning feedings. Malted foods likewise exert a laxative effect. The higher the percentage of maltose, the more laxative the food. The nurse must keep this point in mind in feeding babies. With older children and adults, the question of diet for constipation is quite as important as it is for infants. Prunes or figs cooked with senna leaves and thoroughly strained furnish an excellent adjunct to the diet under such conditions. The coarse breads such as bran and Graham or whole-wheat bread should be used instead of white flour breads. Care should be taken in advising a cereal diet for children, since cereals, with the exception of oats, are apt to be constipating. Fresh fruits, stewed fruits, and fresh vegetables are all good under the above-

mentioned conditions. Young children require the vegetables strained or cut fine. Adults should include one coarse vegetable a day in their dietary to obviate the development of constipation. Children should be taught to drink plenty of water, and babies should not be neglected in this respect. As a rule, very few adults drink as much water as is necessary for the general welfare of their bodies.

RICKETS

Rickets is a constitutional disease, due to disturbed nutrition, developing in infancy and early childhood, generally between the sixth and eighteenth months. The exact cause of this disease is still unknown, but it is much more common in artificially fed infants than those receiving breast milk. This may be due to the fact that the mineral salts, like the other constituents, are combined in the mother's milk in measures which meet the needs of the baby more efficiently than is the case in cow's milk. The metabolism of the phosphorus and calcium in rickets is interfered with, and the bones of babies suffering from this disease show a diminished amount of calcium and phosphorus and an increased amount of water. As the disease progresses the bones bend into deformities, owing to the lack of calcium, which gives rigidity and permanence to the skeleton.

Dietetic Treatment. — The treatment of rickets is essentially one of diet. There is no doubting the fact that good breast milk is the best food in this condition, as it is in all nutritional disturbances, but when it is impossible to secure it for the baby, the next best thing is a properly modified milk formula. This formula must be made to suit the digestive capacity of the individual infant at the time. It is believed, however, " that it is well to keep the percentage of fat lower and that of the carbohydrates higher than would ordinarily be done." [4] This is probably done on account of the effect upon the retention of calcium and phosphorus in the body of the infant, exerted by the different food constituents.

[4] " Diseases of Nutrition and Infant Feeding," p. 324, by Morse and Talbot.

Calcium in the Diet. — In cow's milk the calcium content is in excess of the needs of the baby, hence there is no reason whatsoever to give the ricketic baby additional calcium. If the baby is not breast fed or is not receiving a modified cow's milk, then he may not receive sufficient calcium for his needs, in which case the diet must be changed to one or the other. Care must be observed not to give too rich a food, since in this way the baby's ability to handle a sufficient amount would so limit the calcium intake as to make it insufficient.

Excess Fat and Calcium Retention. — As has already been mentioned, it is probable that an excess of fat in the food may interfere with the calcium retention, on account of the combining of the salts and the fats and in this way interfering with the absorption of the former substance.

Fresh air and plenty of sunshine are necessary in the treatment of rickets. In some cases where anemia is pronounced, it is found advisable to give some form of iron.

SCURVY

Scurvy, like rickets, is a constitutional disease, due to a disturbance of the nutrition, but the disease, while often associated with, is not synonymous with rickets.

Hemorrhages. — Scurvy has been receiving much attention in the last few years. Dr. Alfred Hess and his associates have been making exhaustive investigations to determine the cause of the hemorrhages which are characteristic of this disease, and believe that the tendency toward hemorrhages is due to a weakness of the walls of the blood vessels, rather than to a change in the blood itself.

Factors Inducing Scurvy. — Consensus of opinion proves that scurvy is caused by errors in diet, not temporary errors, but errors which have continued over an appreciable length of time. In the various investigations and analyses of the diets of a vast number of cases the trouble is now believed to be due to a lack of some essential element in the food, and not to any foreign element.

Scurvy in Breast-fed Babies. — Breast-fed babies occasionally develop scurvy, but it is by no means so common in these infants as in those receiving an artificial food, whether that food consists of a milk formula or a proprietary food. Science has proved that while the heating of milk, as in pasteurizing and sterilizing and boiling, may be one of the causes of this disease, it is not the only one, since babies receiving raw milk likewise develop scurvy.

Lack of Vitamines. — Recently it has come to be believed that possibly the lack of vitamines in diet may give rise to this trouble. These substances are extremely sensitive to heat, and when babies are fed upon cooked milk and do not receive other food in which the vitamines are not destroyed by heat, they are apt to develop scurvy. It has been known for a long time that fresh fruit juices and vegetables contain antiscorbutic elements, and for this reason they have been included in the diet of children and adults who are suffering from scurvy.

Treatment. — If the baby is fed on breast milk, the diet of the mother should be changed to increase the nutrients in the milk. When proprietary foods are used they should either be made up with milk or should be eliminated in favor of a modified milk formula. The latter should be pasteurized when necessary, but as low a degree of heat used as possible to bring about the desired result. Orange juice is the simplest and most available of substances containing the necessary properties by which scurvy is relieved. This may be added to the diet after the baby is a few months old, the dose being one ounce per day, given one hour before the milk feeding when the stomach is more or less empty. It may be diluted with water and slightly sweetened if the baby will take it better so. Doctor Hess has found that orange peel also contains the antiscorbutic properties and has the advantage of being cheaper than oranges.[5]

Antiscorbutic Foods. — Since scurvy yields readily to the action of the antiscorbutic properties in orange and lemon juice, it is not necessary to give vegetables to babies. However, in

[5] A decoction made from orange peel and water is given to infants having incipient scurvy in the Hebrew Asylum, New York City.

certain cases a boiled or baked Irish potato finely mashed and given in doses of one to two tablespoonfuls a day results in a rapid recovery. Doctor Hess likewise has suggested the use of potato water instead of cereal diluents in the preparation of infant foods.[6]

Malnutrition is not confined to the children of the poor, though it is more common with infants of parents who have not the means to secure the best milk and give them the benefit of wholesome surroundings and plenty of sunshine. But babies of people in moderate circumstances, and even of wealthy parentage, are at times badly nourished, and require the same exacting care, the same attention to the food, the fresh air, and the sunshine that the poorer babies need in order to survive. Malnutrition may be the result of insufficient food, and it may also be due to the lack of one definite food element. Again, it may be brought on by some deformity of the mouth or stomach, which makes it impossible for the baby to get all the food which he requires for his maintenance and growth. He may be born prematurely and his digestive apparatus not be sufficiently developed to care for the amount or type of food necessary for his needs, or he may have some congenital weakness which interferes with the absorption and assimilation of his food. All of these points must be considered.

Evidences of Correct Feeding. — If the baby shows a steady gain, both in weight and growth of stature, without digestional disturbances, the food given him is probably correct, but it must be kept in mind that nutritional disturbances, such as rickets and scurvy, are slow in developing, and do not manifest themselves with anything like the rapidity of digestional disturbances. Hence the nurse must take care as far as she is able, not only to prevent the food from causing indigestion, but also to see that it is not given in such a form as to induce those graver and more lasting nutritional disturbances which affect the entire system from infancy throughout the life of the individual.

Summarizing the results of errors in the diet of infants, we find that they are both acute and chronic in character, and that they result, not only in digestional disturbances, but in the more grave

[6] "American Journal Diseases of Children," 1914, VIII, 385, by Hess and Fish.

disorders which affect the metabolism and general nutrition of the infant. The acute disorders, such as acute gastro-intestinal indigestion, brought on by over-feeding, may cause death by their very violence, the infant succumbing to the exhaustion which is one of the results in severe attacks. If, however, he survives the first forty-eight hours after the beginning of the acute symptoms, the chances are good for recovery.

Relapse. — One danger which the nurse must always be on the lookout for is the relapse into the acute stage. The diet is the chief treatment. In acute gastro-intestinal disturbances rest from food is essential for at least twenty-four hours. Some infants can easily endure starvation for this short period. However, when malnutrition has already been established, it is not wise to carry out the starvation treatment over-long. A cautious return to a normal diet may be made as soon as acute symptoms disappear. In many conditions of disturbed digestion it is not wise to use cow's milk unless it is predigested, and at times even this treatment does not render it a safe food. In these cases it has been found necessary to use whey mixtures, cereal waters, and albumen water until the baby can once more digest his regular formula. Before giving the latter it must be remembered that the digestive apparatus has lost to a certain degree its capacity to handle the formula suitable to the age and weight of the infant, so that one suitable for a much younger child must be used and gradually strengthened until the original formula is tolerated. It has been proved that many infants who have suffered from an excess of milk sugar in their food have an intolerance for this sugar lasting for months and even years. These babies need other sugars to replace this necessary constituent in their diet.

SUMMARY

Breast Feeding versus Artificial Feeding. — There is no doubt about the fact that the breast-fed baby suffers less from digestional disturbances and has more resistance to disease than the baby fed even upon a perfectly prepared artificial food. Hence

certain cases a boiled or baked Irish potato finely mashed and given in doses of one to two tablespoonfuls a day results in a rapid recovery. Doctor Hess likewise has suggested the use of potato water instead of cereal diluents in the preparation of infant foods.[6]

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every effort must be made by the nurse to assure a sufficient secretion of milk in the mother.

Errors in Diet cause the majority of disturbances in the artificially fed baby. Too much or too little food, badly balanced formulas, too high or too low a proportion of diluent to meet the needs of the individual, unclean or impure milk, or the improper preparation of the formula, all lead to gastro-intestinal disturbances and, if persisted in, will undoubtedly lead to disorders of a much more serious and lasting character. Gastro-intestinal disturbances, colitis, enterocolitis, rickets, scurvy, diabetes, and nephritis are among the diseases traceable to injudicious feeding.

Overfeeding probably causes more of the acute diseases than underfeeding. Most of the gastro-intestinal disorders can be readily traced to the giving of too much food or too strong a formula. These diseases usually yield to a change in the dietary or a period of starvation to allow time for the digestive tract to adjust itself and the surplus food to pass out of the body, this treatment to be followed by a weaker formula, with longer intervals between feedings and small quantities at each feeding.

Underfeeding not only means too little food, but also covers the unbalanced formulas. A baby may be receiving too little of the necessary food constituents for his body requirements. The quantity may be made up in dilution, causing the infant to receive a sufficient amount of fluid at a feeding, but in so diluted a form as to be entirely inadequate for his needs. In this case his appetite is satisfied but the material for the growth, development, and energy expenditures is lacking, hence his body suffers.

Unbalanced Diet. — Excess fat, carbohydrate, or protein, as well as too little of any of these food constituents, results in digestive and nutritional disorders, both mild or grave in character and both acute or chronic in form according to the extent and duration of the dietetic error.

Evidences of an Unbalanced Diet. — The infant is fretful, sleeps badly, loses appetite, fails to gain normally, loses weight, vomits more or less frequently, develops diarrhea, has a rise in

temperature, shows symptoms of intoxication and changes in the bony structure of his body.

Acute Digestive Disorders, on account of their acute character, are quickly recognized and most frequently yield to treatment. A change in the character or quantity of the food, preceded by a period of starvation, as a rule brings about the desired result.

Chronic Nutritional Disorders, such as rickets, are more difficult to handle, less easy to recognize, and consequently more grave in results. Early diagnosis and prompt treatment by diet may arrest the disease and effect a cure unless there is a deformation of the bones.

The Stools, in all infantile disturbances, furnish the chief point of investigation, giving a fair idea of the processes taking place in the infant organism. A study of the stools sometimes shows abnormal characteristics therein and goes far towards enabling the nurse to prevent the gastro-intestinal disorders from making great headway and the disease from becoming chronic.

Too Much Protein in Diet. — Stools are either brown or green in color, large and watery in character, frequent in number and alkaline in reaction, showing the presence of large, hard curds, or they are normal except for the presence of such curds.

Too Much Fat in Diet. — Stools show the presence of soft curds, which are sometimes mistaken for casein curds but may be distinguished from them by their translucent color and solubility in ether. The stools themselves are shiny and gray, large, dry, and at times crumbly in character, especially in chronic conditions due to excess fat in the diet.

Soap Stools is the name given to those in which the fats are combined with magnesium and calcium salts, the salts thus lost in the feces giving rise to nutritional disturbances which at times result in rickets.

Excess Carbohydrate. — Too much sugar (lactose) results in stools watery and green in color and highly irritating in character on account of their acidity.

Dextri-maltose. — An excess of this sugar in diet gives rise to watery, dark brown stools.

Excess Starch. — Stools at times are loose and brown, at others dry and small. Diarrhea is the result of too much starch in the diet, while in other cases constipation results from a like condition.

Fermentation is often the cause of infantile disorders. It may cause an elevation of temperature owing to the absorption of toxic substances produced as the result of bacterial action. The attacks of indigestion (colic and stomach, etc.) are frequently accompanied by diarrhea. The carbohydrates, sugar in particular, are more subject to the action of bacteria in the stomach than the other food constituents.

Dietetic Treatment: Starvation. — No food for twenty-four hours — water or weak tea sweetened with saccharine may be given, nothing else. As acute symptoms disappear and conditions improve, a modified milk formula, weaker than the one used before the attack, may be given. The strength of the mixture may be increased as the infant improves, taking care to make the changes in strength gradually. Malt soup mixtures, buttermilk, whey mixtures, and albumen water may be used in place of the milk formula, if that disagrees. In older children the starvation period may be extended slightly, if necessary, or weak tea and toast given after twenty-four hours. The diet is increased by adding well-skimmed broths, soft eggs, malted milk, or liquid peptonoids as the patient improves.

Enterocolitis may have diarrhea or constipation as chief symptoms, and dietetic treatment must be adjusted to meet the needs of the individual according to the development of the symptoms.

Diarrhea. — When fermentation causes the diarrhea, the logical treatment is to remove the source of fermentation and adjust the diet as already described. When putrefaction is the cause, the patient may suffer from auto-intoxication as the result of the absorption of the toxic substances produced by bacterial action upon unabsorbed food material. Treatment consists in cleansing the bowels to rid them of any putrefied food material, and changing the formula. Buttermilk mixtures are particularly good under the circumstances.

Constipation in infants results most often from too high a percentage of diluents and too low a percentage of solids. A deficiency in the fat content in proportion to the protein and carbohydrates in a formula will also cause constipation. On the other hand, an excess of fat has proved one of the most frequent causes of constipation. Excess starch is another cause of this disorder in babies.

Constipation in Older Children is often brought on as the result of insufficient solid food and too much milk in the diet. Thirty-two to forty ounces a day is the maximum quantity of milk allowable during the second year.

Treatment. — Malted foods exert a laxative effect and can be used with good results for babies. After a few months, orange juice may be given between the morning feedings and does much to overcome this condition. With older children coarse breads, prunes and figs cooked with senna leaves, fresh fruits, and green vegetables all exert a stimulating effect upon the peristaltic movements of the intestines and tend to overcome the constipation. Cereal foods, except oats, are apt to constipate children, hence should be given with care to children inclined that way.

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Dietetic Treatment. — Good breast milk is undoubtedly best for babies. When this is not obtainable, a good milk formula, in which the fats are kept low and the carbohydrates correspondingly higher than under ordinary circumstances, should be used. Fresh air and sunshine are necessary adjuncts to the treatment of rickets.

SCURVY

Errors in Diet probably give rise to this condition. These are not temporary in character but long-standing. It is believed that the disease develops as the result of an insufficiency in some essential element and not from the presence of some foreign element.

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ing, and is poured into a glass funnel and through the soft rubber catheter into the stomach. Care must be observed to prevent the patient struggling on account of the heart weakness which invariably complicates this disease.

WHOOPING COUGH

In the early months of life it is probable that whooping cough is one of, if not the most fatal of the diseases to which the infant is subjected. The period of incubation of this disease is from one to two weeks, the cough at first not appearing different from those accompanying colds of all sorts. However, in from ten days to two weeks the characteristic whoop occurs, differentiating this disease from all others. The symptoms aside from the whoop are the difficulty of taking breath and the great prostration after the paroxysm and the frequent vomiting of the food, brought on by the violent coughing.

In very young infants the whoop does not always occur. But the child coughs and holds its breath until it is blue in the face. At times young babies may have convulsions. The so-called spasmodic stage, during which the child may have from a few to a great number of paroxysms of coughing a day, lasts from a month to six weeks, and in some cases even longer. As the disease declines the cough gradually disappears, and the child appears to be suffering with ordinary bronchitis. The characteristic whoop may return at any time during the ensuing six months or year if the child has an attack of bronchitis and is inclined to cough.

Complications and After-effects. — The complications and after-effects of whooping cough give it a serious character. Hemorrhage may occur from the nose. According to Ruhräh: "Paralysis may follow from meningeal hemorrhage, broncho-pneumonia, acute empysema, and collapse of the lung may occur. Diarrhea, convulsions, and albuminuria are also met with. Tuberculosis and chronic bronchitis may follow." [4]

Dietetic Treatment. — The diet plays an important part in whooping cough. The serious complications and after-effects of

[4] "Diseases of Infants and Children," p. 326, by Ruhräh.

this disease upon children necessitate a rigid observance of dietary laws. With infants it is always best, when it is possible, to give breast milk. As this is the natural food it requires less effort on the part of the digestive apparatus to become available. It has been proved that even during the time when the baby is nursing the milk is projected in spurts into the duodenum without waiting to be attacked by digestive enzymes in the stomach, and for this reason the breast-fed infant is more apt to be efficiently nourished than the artificially fed baby, who loses his dinner by vomiting before absorption has had a chance to occur.

Diet under Ten Years of Age. — For children under ten years, a fluid diet is necessary, at least in the beginning of the disease while there is a fever, and later, if the vomiting is persistent. Milk, buttermilk, koumiss, broths, albumenized beverages, and cereal gruels such as barley and oatmeal gruel and arrowroot gruel can be given. Later, if the fluids are retained, cream of wheat, farina, junket, soft custards, and soft-cooked eggs may be added. Care must be taken in giving toast, unless it is softened with milk or broth, for the crumbs may bring on a paroxysm of coughing and vomiting. The best results in feeding with whooping cough are obtained by giving the food in small quantities and oftener. A few ounces given every two hours are less apt to be vomited than a larger quantity. It is also easier for the child to take the small amount after an attack of coughing and vomiting than it would be for him to attempt a larger meal.

Use of Stimulants. — In many cases where weakness is great, it has been found advisable to add some stimulant to the diet. With infants this is best given in albumen water, a small amount of good brandy acting better than other stimulants. With young children some of the predigested liquid beef preparations, such as liquid peptonoids, are found valuable. These foods are given alternately with the other fluid foods.

Hygiene and Sanitation. — Infants and children suffering with whooping cough require plenty of fresh air and sunshine. They must be kept out of doors as much as possible and sleep in well-ventilated rooms or sleeping porches. They must be protected

from drafts and excitement, and never allowed to become overtired. In this way the anemia which so often results from prolonged attacks of whooping cough is in a measure held in check. At times it is found necessary to give some kind of an iron tonic, but this comes under the jurisdiction of the physician instead of the nurse. When bad effects do occur in spite of all the care exercised during the attack of whooping cough, they must be accorded the treatment especially devised to meet the situation.

MEASLES

This is an acute, infectious disease characterized by a red eruption which appears on the fourth day. Measles is one of the most contagious of all the diseases of childhood. It may be acquired by direct contact with another case or by being in the room with a case. The infection may also be carried through the air and occasionally by a third person. Measles is more prevalent in the winter than in summer. In cities it often occurs in epidemics. The period of incubation is from ten days to three weeks, occurring generally at about two weeks after exposure.

The attack may begin with the child showing a languid attitude, complaining of headache. Then a cough develops, with nausea and fever at times. The fever is often high, reaching 104° F. on the second day. As a rule the fever gradually falls after the second day and becomes normal in almost a week. However, the temperature varies in different cases.

Complications. — Measles is not considered dangerous in itself, but the after-effects sometimes prove fatal. This is especially the case in broncho-pneumonia, which frequently develops during or after the attack.

The gastro-intestinal, as well as the respiratory, tract is attacked in measles, diarrhea being especially common. Very weak children have been known to develop gangrenous stomatitis; paralysis and tuberculosis [5] likewise develop in some cases as the direct result of measles.

[5] "A Manual of Diseases of Children," p. 319, by Ruhrāh.

Thus it is demonstrated that measles is not to be lightly treated. Even if it is not in itself fatal, the results of the disease are so dangerous that the care of the nurse is especially necessary. The great trouble is that so often a nurse is not in attendance and the child suffers through ignorance of the mother.

Dietetic Treatment. — The dietetic treatment of measles is important. For infants milk is the exclusive diet, the formula for bottle-fed babies having to be weakened on account of the catarrhal condition of the gastro-intestinal tract. For older children it is necessary to confine the diet to fluids as long as the fever lasts, and at times longer if the stomach gives evidence of digestional disturbances. Milk is the chief food, with milk soups, buttermilk, and koumiss used to vary the diet. Orangeade and lemonade may be given to allay thirst. A return to normal diet must be made gradually, giving cereal gruels, milk toast, and broth before the more solid articles of diet suitable to the age of the child. When there are complications they must be treated, as in whooping cough, according to their symptoms.

SUMMARY

Gastro-intestinal Disturbances are responsible for much of the fever manifested during infancy and childhood.

Infectious Diseases are all more or less accompanied by an elevation of temperature.

Incipient Diseases, especially tuberculosis and scurvy, may likewise cause a rise of temperature. The relief of either disease or the fever depends largely upon how quickly the conditions are discovered and the means instituted to overcome them.

Metabolism in Febrile Conditions of children, as well as of adults, is rapidly increased, hence the energy output is greater, and for this reason the fluid intake must be augmented in order to eliminate the toxic substances produced as a result of the rapid breaking down of the body tissues.

The Kidneys are more or less strained to eliminate the products of the increased metabolism and for this reason it is especially necessary to adjust the diet in order to limit, as far as

possible, the foods which add to the burden already imposed upon the organs of excretion.

The Skin is an organ of excretion which, under normal conditions, shares the work of the kidneys. In infectious conditions, accompanied by eruptions which more or less cover the entire surface of the body, this organ is temporarily out of commission, hence its work, as well as their own, must be accomplished by the kidneys.

Dietetic Treatment in the majority of infectious diseases may be divided into three periods: Starvation, Fluid Diet, and Convalescent Diet.

Starvation, during which time no food is given for twenty-four hours or longer, in order to allow the digestional apparatus to rest and to give time for any substance which may be causing the elevation of the temperature to pass from the body. This treatment is also wise because it furnishes an opportunity for the symptoms of the disease to manifest themselves; Fluid Diet, given when acute symptoms subside, and Convalescent Diet when danger from relapse is over.

Scarlet Fever is treated with two main ideas in view — preventing the development of nephritis and relieving the condition should it develop.

Diet Treatment is logically the only means of treating or relieving nephritis. For the first three weeks, during which time this complication is apt to develop, a milk diet is necessary. This may be in the form of whole milk, milk soups, malted milk, etc. At the end of this time, if there are still no symptoms of nephritis, a convalescent diet, beginning with cereals and soft toast and progressing through the simple digestible foods such as rice, baked potatoes, soft eggs, etc., may be given. This is continued until the patient is well on the road to recovery. Meat should not be added until practically all danger of nephritis is passed.

Nephritis. — If, during the course of the disease this complication should develop, the treatment described for acute nephritis on page 307 should be immediately instituted.

Diphtheria. — Dangerous complications at times develop as

a result of diphtheria, making the treatment of this disease of the utmost importance. Heart symptoms, pneumonia, albuminuria, and anemia are among the complications to be dreaded and combated.

Dietetic Treatment in diphtheria is most important. It consists of a fluid diet made up of milk, malted milk, or buttermilk. At times the condition of the throat makes a slightly thickened mixture more easily swallowed than one which is distinctly fluid in character, and for this purpose farina, arrowroot, or barley flour may be used.

Increasing the Diet. — As convalescence advances the semi-solids, soft toast, soft custards, gelatine, and cereals may be given. Should the heart show symptoms of being affected, the intake of fluid must be restricted.

Gavage and Rectal Feeding are at times necessary. Infants may be successfully fed by passing a small rubber tube through the nose into the stomach and administering the milk formula to which they are accustomed. Rectal feeding is likewise valuable in cases of extreme anemia accompanying diphtheria.

Care must be observed by the nurse in giving gavage to babies, since any struggling on the part of the child may result in death from heart disease.

Whooping Cough. — On account of the character of the disease and the proneness of the stomach to eject the food during paroxysms of coughing, dietary measures are more or less necessary in order to enable the child to receive sufficient food to cover his daily needs.

Complications. — Hemorrhage, pneumonia, albuminuria, diarrhea, and convulsions during the course of the disease, while tuberculosis and chronic bronchitis may follow as after-effects.

Dietetic Treatment. — Breast milk is by far the best food for the baby, in this as in all conditions. In whooping cough the fact that this fluid leaves the stomach almost as soon as it enters lessens the chances of the baby losing its meal by vomiting it.

Older Children do well with frequent small meals, since they are not so apt to give rise to pressure which brings on the

paroxysms of coughing and vomiting. When the meal is vomited, a second should be given in order to keep the child from suffering from malnutrition.

Stimulation is found to be necessary in certain cases. Albumen water containing a spoonful of brandy or some of the prepared beef preparations, such as liquid peptonoids, may prove valuable under the circumstances.

Measles. — Complications and after-effects developing as a result of measles make the dietetic treatment of this disease important. Gastro-intestinal disturbances, especially diarrhea, are apt to occur, and tuberculosis has been known to develop as a result of measles.

Dietetic Treatment. — The fluid diet as used in any acute febrile condition is used as long as the temperature is elevated. Milk, buttermilk, malted milk, and milk soups constitute the chief items in the diet. Orangeade and lemonade are found valuable in relieving the thirst.

FORMULAS USED IN FEEDING INFANTS

Whey

Put one pint of skimmed milk into a clean saucepan and heat to a temperature of 100° F. (lukewarm). To this milk add 2 teaspoonfuls of liquid rennet, essence of pepsin, or 2 junket tablets, stir until well mixed, and allow to stand at room temperature (70° F.) until firmly jellied. Break up with a fork until it is finely divided, strain through thicknesses of cheesecloth; return the fluid part to the stove and raise to a temperature of 150° F. to destroy the rennet left in the whey. The whey is then cooled before it is added to the milk or cream.

Barley Water

3% decoction starch[6]
4 rounded tsp. barley flour
1 pt. water

[6] When a 1.50% decoction is desired, use 2 rounded teaspoonfuls to the pint of water. "Diseases of Nutrition and Infant Feeding," p. 222, by Morse and Talbot.

Mix a small amount of the water with the barley flour and put the rest of the water into a clean saucepan and allow to heat; when boiling add thin barley mixture, stir thoroughly, and allow to boil 20 minutes; remove from stove, measure, and replace with hot water that which was lost through evaporation to make up the original pint; strain through two thicknesses of cheesecloth.

Oat Water

4 rounded tsp. oat flour
1 pt. water
Mix and proceed as in making barley water

Albumen Water with Brandy

8 oz. water (cold)
1 egg white
1 tsp. brandy

Mix egg and water and add brandy slowly to prevent coagulating egg white.

Buttermilk Mixture for Infants

544.6 calories

1 tbs. wheat flour, 4 tbs. dextri-maltose, 8 oz. hot water plus enough hot water to replace that which is lost through evaporation (about 6 oz.). Buttermilk, sufficient quantity to make 1 quart of mixture. Mix flour with a little cold buttermilk. Dissolve sugar (dextri-maltose) in the hot water.

Stir two mixtures together and add enough buttermilk to make 1 quart. Place on stove and bring mixture quickly to a boil. Boil for 20 minutes, stirring constantly, strain, measure, and add enough boiling water to replace that which is lost in cooking. Place on ice and use as directed.

The nurse will soon be able to tell how much water is lost in evaporation and add the additional amount to the mixture before beginning the boiling.

Malt Soup

347 calories

1½–2 tbs. malt soup extract (reduce if necessary)
1 level tbs. sifted flour
1 pt. milk
18 oz. water (hot and cold)

Dissolve malt soup extract in ½ cup of hot water and measure in enough cold water to cool the mixture. With the remaining cold water mix the flour until it is free from lumps; add to the malt soup mixture, add milk. Pour all into a clean saucepan and bring slowly to the boiling point; simmer (not boil) for 20 minutes. Now increase the heat and allow the mixture to boil 5 minutes; strain and use as directed.

This is a fattening mixture and the amount of malt soup and whole milk may be increased as the child is able to handle it, taking care, however, not to increase the strength of the mixture too rapidly or too much, or digestional disturbances will result.

The following milk formulas are used in the Nathan Straus Pasteurized Milk Laboratories of New York:

Formula No. 1. Infants from 1st to 4th week, by A. R. Green.

24 ounces of mixture divided into 8 feedings of three ounces each, fed at intervals of 2½ hours:

¾ oz. 16% cream
3 oz. full milk
19 oz. water
1¼ oz. limewater
1½ oz. milk sugar

Formula No. 2. Infants 1st to 3d month, by Dr. R. G. Freeman.

1½ oz. 16% cream
3 oz. full milk
13 oz. water
½ oz. limewater
1 oz. milk sugar

Divided into 6 feedings of 3 oz. each, fed 3 hours apart.

Formula No. 3. Infants 2d to 6th month, by Dr. R. G. Freeman.

18 oz. full milk
16½ oz. water
1½ oz. limewater
1½ oz. milk sugar

Divided into 6 feedings of 6 ounces each, fed at intervals of 3 hours.

Formula No. 4. Infants 3d to 7th month, by Dr. A. Jacobi.

18 oz. full milk
18 oz. barley water
1 oz. cane sugar
20 grains salt (less than ¼ tsp.)

Divided into 6 feedings of 6 ounces each, fed at intervals of 3 hours.

Formula No. 5. Infants 7th to 9th month, by Dr. A. Jacobi.

2½ oz. full milk
7½ oz. oat or barley water
1½ oz. cane sugar
30 grains (about ¼ tsp.) table salt

Divided into 5 feedings of 6 ounces each, fed at intervals of 3½ hours.

Beef, Mutton, or Chicken Broth

1 lb. lean meat
1 lb. bones
or
2-lb. hen
1 qt. cold water
½ tsp. salt

Cut meat in small pieces, crack bones, or cut chicken as for frying. Place in a clean saucepan and cover with cold water; cover and simmer gently from two to three hours; strain and measure; add enough hot water to replace that which was lost through evaporation. Allow broth to become thoroughly cold and skim carefully to remove fat. Pass a piece of tissue paper or absorbent

cotton or blotting paper across the top to remove the last particles of grease that may have escaped. Place on ice. The broth should jelly. Two ounces should be given at noon. This amount may be increased to 4 ounces. Bread crumbs or zwieback may be added to the broth after a few weeks.

Junket

Part of the milk given the baby may be made into junket after the baby is a year old.

½ pt. (1 cupful) milk
½ junket tablet or 1 tsp. essence of pepsin
1–2 tsp. sugar
Flavor with a few drops of vanilla, if desired

Heat the milk to lukewarm (not over 100° F. or the rennet will be destroyed).

Add sugar and flavoring; dissolve junket in a teaspoonful of cold water, stir into the milk; allow to stand at room temperature (from 70°–75° F.) until firmly jellied; then place on ice.

Prunes

Prunes should be carefully selected. As a rule the cheap varieties are little else than skin and stone.

Place 1 pound of prunes in a saucepan and cover well with water. Simmer gently from 2 to 3 hours, then sweeten moderately; a quarter of a cup of sugar should be ample to sweeten 1 pound of prunes after they have been cooked.

Stir the sugar into the hot juice, allow to cook 10 minutes. Remove from saucepan; place in glass jar and use as needed.

Prune pulp may be made by pressing the prunes cooked as directed through a fine strainer.

When prunes are to be used primarily for their laxative effect, 1 tablespoonful of senna leaves may be added during the last hour of cooking and carefully strained out before placing the prunes in the glass jar.

One-half pound each of prunes and figs may be cooked together

in a like manner and may be used instead of prunes alone for older children who suffer from constipation.

Bran biscuits, muffins, cookies, etc., may be given to children suffering from constipation.

Beef Juice

Composition: 0.60% fat, 2.90% protein, and considerable extractive matter.[7]

Place a piece of round steak upon a hot griddle and turn once or twice until the outside is seared and the meat is hot throughout. Remove from griddle and cut into small pieces and place in a small meat press made for the purpose. A lemon squeezer may be used when the press is not available. Salt lightly. Begin by giving one teaspoonful and increase the amount gradually to 1 ounce (6 teaspoonfuls). According to Morse and Talbot, it is never wise to give babies more than 2 ounces of beef juice even in their second year, as it is apt to disturb digestion. Also babies are often made restless or sleepless by taking beef juice.

[7] "Beef juice is not the same as 'dish gravy,' since the latter contains a large amount of cooked fat and is often highly indigestible." Morse and Talbot's "Diseases of Nutrition and Infant Feeding."

CHAPTER XIII

THE FEEDING OF ADULTS IN DISEASES OF THE GASTRO-INTESTINAL TRACT

ACUTE AND CHRONIC GASTRITIS

Predisposing Factors. — The majority of diseases affecting the stomach have as their predisposing factors, and owe their development to, one or all of the following conditions: (1) errors in diet; (2) disturbed secretory processes; (3) disturbed motility and tone.

It is probable that in the beginning the first factor was the chief offender in the case, bringing about the development of one or both of the other conditions. The other factors to be considered in this respect are heredity, occupation, poverty, and diseases which involve to a greater or lesser degree the digestion of the stomach and intestines. A child may inherit a weakened organism through excesses or disease on the part of the parent. If this weakness is not overcome while the child is growing, the probabilities are that the digestion steadily declines until in adult life it becomes a pathological condition. Lack of fresh air, poor and dirty food, unwholesome surroundings, crowded and badly ventilated sleeping rooms, insufficient water, and overwork, all act in making the digestion bad. These must be overcome if permanent good is to result.

Errors in Diet. — Errors in diet arise more often through ignorance than from any other cause. A child may be allowed to eat any and all kinds of unwholesome and unsuitable food. When the stomach rebels, showing the serious danger signals of nature, medicines are given but the diet is unheeded, until the time comes when even the medicines fail to give temporary relief, and the organs of digestion are in some instances permanently impaired.

Disturbed Secretory Processes. — Consensus of opinion goes to show that the majority of cases of acute and chronic gastritis (catarrhal) and gastric ulceration are due primarily to a disturbance of the secretory processes, while the impaired motility and lack of tone in the stomach probably influence their development and aggravate the disease already present.

Composition of Gastric Juice. — In a former chapter the processes of gastric digestion were explained. The gastric juice, composed of from 0.2 to 0.3% free hydrochloric acid and several important enzymes and lipases, which act upon the proteins and emulsified fats, must be sufficient in quantity to assure good digestion, and when anything arises to interfere with the secretion of this fluid a deviation from the normal is bound to occur.

Disturbed Motility and Tone. — Again, it has been proved that good gastric digestion, like good intestinal digestion, depends more or less upon the way in which the food mass is mixed with the digestive juices and moved along the alimentary canal. Anything which interferes with the secretion of the juices or delays the food over its normal length of time in the stomach surely exerts unfavorable influences on the general metabolism of the food, for while, as we have already found, gastric digestion is not essential to the final utilization of the food in health, in disease it undoubtedly exerts a marked influence upon the general nutrition of the individual.

HYPOCHLORHYDRIA

The lack of hydrochloric acid in the gastric juice lowers the resistance to bacterial action, for this constituent exerts a decided germicidal influence in gastric digestion, preventing fermentation with the production of organic acids and probably alcohol. In conditions due to hypochlorhydria (lack of hydrochloric acid) foods which leave the stomach quickly must be given with enough of the other necessary constituents in their simplest and most easily digested form to balance the diet and prevent the occurrence of the other disorders as troublesome as the original disorder.

Dietetic Treatment. — The following points must be kept in mind in formulating a dietary for patients suffering from a deficiency of hydrochloric acid: (1) boil the drinking water to destroy any bacteria which may be present; (2) use carbohydrates in the form of starch rather than sugar, since starch is less liable to fermentation from bacteria than sugar; (3) limit the foods which delay the passage of the food mass from the stomach; fats pass into the duodenum more slowly than other foods and when fed with other foods delay their passage materially; (4) avoid the use of soda bicarbonate, as it tends to reduce the normal acid content of the stomach, thus preventing its germicidal action upon the fermentative bacilli; alkaline carbonates likewise inhibit the flow of gastric juices; (5) give especial attention to the attractiveness of the food served; let it be appetizing and savory, for by such means is the appetite juice and incidentally an increased flow of the gastric juices stimulated; (6) condiments and spices, meat broths high in extractives, and salt foods such as caviar and endives may be given at the discretion of the physician; it is seldom advisable to give the foods which are indigestible, even when they act as stimulants to the secretory cells of the stomach.

HYPERCHLORHYDRIA

(Excess secretion of acid in the stomach)

The Effect of Excess Acid. — An excessive flow of hydrochloric acid has been found to be the cause of much of the acute and chronic gastritis, in fact more of the cases are traceable to an excess than to a lack of hydrochloric acid. This acid is more or less irritating in character, and the tender mucous membranes lining the gastric organ being constantly bathed in a secretion composed chiefly of acid must necessarily in time suffer a certain amount of irritation and inflammation, causing the development of a pathological condition which may be temporary or permanent, that is, it may result in acute or chronic gastritis, according to the amount of acid secreted and the length of time the hypersecretion is allowed to continue.

Determining the Acid Content of Stomach. — The difference between the cases brought about by an excess flow of hydrochloric acid are more or less difficult to distinguish from those caused by a lack of this constituent in the gastric juice, chiefly because in the latter case the organic acids formed as the result of bacterial action upon the food exert an equally irritating effect upon the membranes of the stomach, and the only sure method of determining the cause of the disturbance is by an analysis of the stomach contents, by which means the percentage of hydrochloric acid is determined.

Lavage. — It has been found advisable, in some cases of acute gastritis which do not yield readily to rest and liquid diet, to wash the stomach and allow a certain period of rest before giving any food; in this way the organ is rid of all of the offending material and thus has a better chance of a quick recovery.

ACUTE GASTRITIS

Dietetic Treatment. — The following dietetic treatment for acute gastritis is advised: As the stomach is the chief seat of disturbance, all unnecessary work must be taken from this region for a certain period:

(1) That any obscure cause may manifest itself and the diagnosis may be rendered more accurately and more quickly.

(2) That by resting the organ the offending materials may pass out of the body and thus prevent further trouble.

Starvation Period. — Twenty-four hours of total abstinence from food may seem extreme, but as a rule in acute cases of gastritis it is the only sane and safe method of instituting a diet and thus beginning to overcome the cause of the disturbance. After the period of starvation the diet is begun with caution.

Fluid Diet. — Fluids should be given first in the form of well-skimmed broths, which may be reënforced with egg or cereal flours when the patient is very thin or anemic. Buttermilk, made with the Bulgarian cultures, koumiss and other fermented milk foods, liquid beef preparations such as peptonoids or panopepton, albumenized orange juice, cereal gruels treated with Taka diastase

when it is found necessary, and peptonized milk. These may be given in from four to six ounces at a time, every two hours on the second day.

Increasing the Diet. — On the third day if the attack is slight the diet may be increased by adding toast, softened with peptonized milk, an ordinary serving (3 ounces) of farina, cream of wheat or rice, reënforced meat broth with two crackers, a cup of tea and a slice of toast, and one or two soft-cooked eggs. If the acute symptoms are still present on the third day, the diet advised for the second day must be continued until they disappear.

Convalescent Diet. — On the fifth day, if progress is satisfactory, lightly broiled chicken or a small piece of rare broiled beefsteak may be added to the diet and the meals reduced in number from six to four.

Relapse. — The patient must be warned against over-eating or eating any of the articles which are known to cause an acute attack in his individual case, since one attack predisposes to another, and chronic gastritis may develop as the result of the continual gastric disturbance.

CHRONIC GASTRITIS

The treatment in chronic gastritis is very like that in the more acute form; that is, it must be combated by removing the cause. Lack of fresh air and exercise have much to do with the development of chronic gastritis, but even they combined with a judicious amount of rest would be wasted without a proper adjustment of the diet to cover the main points of the disturbance. As has already been mentioned, the cause may be a lack of gastric juice or it may be an excess of it; it may be intensified by an atonic condition of the organ or from the food passing too quickly into the duodenum.

Test Meals. — As a rule it is not safe to make a snap diagnosis as to the cause of this disorder. Since in many instances the more serious disorders may be traced to a disregard for nature's danger signals, the physician as a rule advises a test meal, this meal consisting of a glass and a half of water or a cup or two of tea with-

out cream or sugar and from one to two slices of toast or water rolls. In from three-fourths to one hour or longer this is removed from the stomach by means of a stomach pump and analyzed, the result of the chemical and bacterial analyses forming the bases for diagnosis. This meal is generally given in the morning before any other food has been eaten.

Dietetic Treatment. — The foods constituting the diet in chronic gastritis must be of the simplest character and prepared in the simplest manner. No fried foods are permissible. Pastries, griddle cakes, rich puddings and sauces, candies, and alcoholic beverages must be omitted from the diet as well as the following articles of food: pork, veal, shellfish except oysters, sardines, canned meats and canned fish, highly seasoned and spiced dishes, twice-cooked meats, vinegar, pickles, olives, cold slaw, pickled beets, catsup, mustard, coarse fibered vegetables such as cabbage, old onions, old turnips, and cucumbers, strong tea, coffee, or chocolate, rich cream or dishes made entirely of cream. In cases of excessive acidity due to a hypersecretion of HCl the extractives of meat are contraindicated, hence all gravies and outside parts of roasted meat must be omitted or limited in the diet.

GASTRIC ULCERATION

Gastric ulcer may develop without an apparent cause. As a rule, however, it manifests itself in individuals between fifteen and forty, particularly after prolonged digestional disturbances, especially those accompanied by a hypersecretion of acid. As the disease progresses, anemia is more or less severe, adding difficulty to the feeding problem. Many of the symptoms are like those of chronic gastritis, such as pain. However, the character of this pain may be different, beginning soon after eating and radiating toward the back. This point may be affected by position. As a rule there is a tenderness over the seat of the ulcer. This is detected by palpation. Vomiting is one of the most general symptoms in gastric ulceration. This may begin from one to two hours after eating when the pain is at its height, or it may start as soon as food enters the stomach. As a rule the latter condition is found

more often in very nervous women whose mental attitude affects the stomach to such an extent as to make it difficult to give them sufficient food to nourish them.

Hemorrhage. — Hemorrhage occurs in about half of the cases. The bleeding may be profuse and the blood bright red, or it may be less severe and the color of the blood changed by contact with the gastric juices to a dark brown like coffee grounds.

Excess Acid. — Hyperacidity is present in the majority of the cases, the percentage of HCl rising at times fifty per cent or more. Other cases occur in which all of the just mentioned symptoms except dyspepsia are missing, the first intimation of the ulcer being hemorrhage or perforation.

The patient with gastric ulcer may recover entirely and never have a return of the trouble, but care and close attention are necessary, since the ulcers are apt to recur, at times a series of ulcers developing one after another. Death may occur from exhaustion or from perforation and peritonitis. Surgical intervention is as a rule necessary when the ulcers persist, as they generally develop at or near the pyloric opening; and the constant development of cicatricial tissue brings about an obstruction of the pylorus, which if not relieved would allow the patient to starve.

Diet Treatments. — There are a number of treatments used in overcoming this condition. After the test meal and the diagnosis, the patient is placed upon a diet directed to overcome the chief symptom; for example, if the ulcer developed as a result of hyperacidity, the diet would be directed toward the relieving of that symptom. Boas[1] divides the treatment into three stages: (1) hemorrhage; (2) the intermediate stage; (3) the convalescent stage.

Starvation Treatment. — The majority of physicians institute a total abstinence period for the first stage, allowing no food or water to be taken by mouth. If the patient is very weak and anemic from the extended course of the disease, nutrient enemas are given from four to six times a day, alternating with saline enemas. This total abstinence continues from three to six days.

[1] "Diseases of the Stomach," by Boas.

Some cases have been know to be fed in this way for a month or six weeks with obvious success. However, this is not the rule but the exception. The diet must be adjusted to the needs of each individual, but a few general rules may be found helpful.

Dietetic Treatment. — Milk is the food generally utilized in the beginning. This may require peptonizing to be digested, or it may have to be modified with limewater. Protein foods require HCl for their digestion. If these foods are fed they will absorb some of the excess acid, and in this way save the already irritated wall of the organ from additional irritation. When protein foods are given they must be in the form of soft-cooked eggs, scraped raw beef or beef juice, milk soups, and like protein foods.

When there is a dilatation of the organ there is more or less danger of fermentation taking place, with the formation of organic acids. These acids are exceedingly irritating, and every care must be observed to prevent their production. The following dietetic régime may be used as a guide in many cases of gastric ulceration:

Milk Diet. — ½ glass (4 ounces) of milk peptonized at 115° F. for 20 minutes, every hour for three or four days. After this the interval between feedings is lengthened to two hours and the amount of milk increased to ¾ of a glass (6 ounces). This is continued from a week to ten days. The patient may be given a cup of well-strained meat broth, reënforced with an egg, once or twice a day, to vary the monotony of the diet. During the third week the milk may be given in the form of milk soups. These may be slightly thickened with barley, rice, or farina flour. The soups may be flavored with beef extract, but only a small quantity must be used, owing to the stimulating properties of these substances.

Water as a Stimulus to Gastric Secretion. — Water is exceedingly stimulating to the acid secreting cells of the stomach, hence it is advisable to limit the amount of water taken by mouth, allowing the patient just enough to wash out the mouth without swallowing any. The thirst is relieved by saline enemas.

Convalescent Diet. — During the fourth week, if the pain and discomfort are decreasing, soft-cooked or creamed eggs may be added to the diet, together with thoroughly boiled rice, farina, cream of wheat, wheatena and other finely ground wheat foods, wine or fruit jelly, sweetened slightly, or by using a small amount of saccharine for the purpose, junket and plain vanilla ice cream. At the end of the fourth week a very small portion of meat may be given once a day. It may be scraped raw beef spread upon toast or zwieback, or very lightly broiled beefsteak, broiled lamb chop or chicken (breast only), or boiled or broiled sweetbreads or brains. Spinach or green peas pressed through a sieve are the first vegetables allowed. After these young tender carrots and string beans may be given. Tea, coffee, and chocolate are eliminated from the diet. Milk flavored with coffee or cocoa may serve as a hot drink in the morning when the desire or need for such a drink is manifested. Butter is the best form of fat to be used in cases of gastric ulceration, but this must be given with the greatest caution. In cases where this fat is used in the form of cream, the amount must be cut down or entirely abandoned when there are evidences of butyric fermentation. Buttermilk, koumiss, and other fermented milk drinks are often found very satisfactory adjuncts to the diet. These may be given between meals, or at meals they may be substituted entirely for the milk when other foods are being given. They are not sufficiently nourishing to take the place of the milk diet otherwise. Albumenized orange juice and cream, egg and vichy may be given to add variety to the diet.

Anemia. — When anemia is severe, as is often the case in gastric ulceration, the diet must be reënforced to overcome it. Some of the concentrated milk foods such as plasmon, encasin, sanatogen, etc., as well as the predigested meat foods, such as panopepton, liquid beef peptonoids, and like preparations, may be used to reënforce the diet.

Bland Diet. — In certain cases of gastric ulceration it has been found more advisable to use what is known as a bland diet. This consists of farinaceous foods such as farina, arrowroot, cream of

wheat, corn meal, wheatena, malted breakfast foods cooked thoroughly and given in the form of gruels, and some of the proprietary infant foods, such as Mellin's Food, Eskay's Food, Racahout. These foods may require the addition of Taka diastase to make them more readily digested. They leave the stomach more rapidly than any of the others, and for this reason will be found to give less discomfort than the foods containing a high percentage of protein and fat. This diet, however, cannot be prolonged on account of its lack of balance. If the gruels are made with milk instead of with all water they become more evenly balanced. Samples of the stomach contents may be taken for analyses from time to time.

Lavage. — When lavage is necessary the patient must be allowed to rest after the process before being given food, otherwise it is apt to be vomited.

Instructions to Nurse. — The treatment for gastric ulceration is thus seen to be strenuous. In the beginning the patient is placed on a liquid or semi-solid diet, or is not fed at all for a time. This is done that the diseased organ may have a chance to adjust itself as far as possible and to give the physician an opportunity of studying the changes taking place in that organ. During the course of the disease the general symptoms which develop from time to time, causing more or less pain and discomfort to the patient, are nervousness, which in some individuals amounts to melancholia, extreme anemia and an utter distaste for food, all of which require patience on the part of the physician, the nurse, and the patient herself to overcome. The nurse must see that the patient is not disturbed or made unhappy by having business or home cares talked over in her presence; she must be kept as cheerful and as comfortable as her condition permits and urged to use care in her diet. After the ulcer is healed, to prevent a return of the trouble she must be warned against eating too fast or when over-tired, and she must be advised against very hot and highly seasoned foods, for, in the observance of these simple common-sense precautions only is she even in a measure saved further attacks.

GASTRIC CANCER

As a rule the seat of the gastric cancer is the pylorus. The patient gives evidence of chronic gastritis with continued pain, localized tenderness, vomiting of partially digested food and at times dilation from extreme fermentation. The hemorrhages are as a rule not large, the blood having changed to a brownish color resembling coffee grounds. Vomiting, in cases where the pylorus is involved, generally occurs several hours after eating, the vomitus being in an advanced state of fermentation. Upon analysis of the stomach contents there is found to be a lack of free HCl.

Dietetic Treatment. — In the dietetic treatment of cancer of the stomach the most digestible forms of foods must be given, milk forming in this, as in other gastric disorders, the chief article of diet. As too much food cannot be tolerated, the meals must be small, even if given more frequently. The patient is often found to evince a distaste for meat, in which case fish may be substituted. When meat is given, it must be simple in form and preparation, such as boiled or broiled sweetbreads or brains, scraped beef or stewed chicken. Rice, farina, cornmeal mush, and other fine cereals, cooked with or without milk, are valuable additions to the diet. Well-cooked and strained spinach, green peas, cauliflower, carrots, and tender string beans and boiled or baked potatoes well mashed may be recommended. Tea, coffee, or cocoa may be used to flavor the milk. These must be given in small portions. The following diet list is recommended by Friedenwald and Ruhräh:

		Calories
8 A.M.	100 grams of milk with tea	100.0
	30 grams of milk toast	130.0
10 A.M.	100 grams of baked trout	106.0
	100 grams of milk or 30 grams panopepton (57.5)	67.0
	10 grams of butter	81.0
	50 grams of toast	130.0
	50 grams of sherry	60.0

		Calories
12 M.	Bouillon with 5 grams somatose	16.0
	100 grams of chicken or 100 grams squab (100) or 100 grams of calves' sweetbreads (90) or 100 grams of calves' brains (140)	106.0
	60 grams of macaroni . . . or 100 grams of mashed potatoes . . . . . . or 100 grams of spinach (166) . . . . . 2120. or 100 grams of asparagus (18)	
	25 grams of stale wheat bread	65.0
4 P.M.	20 grams of toast	130.0
	20 grams of butter	162.0
	40 grams of caviar	52.0
7 P.M.	130 grams of milk (100) with 5 grams, somatose (16)	116.0
	100 grams of rice cooked in milk	177.0
	50 grams of wheat bread	130.0
9 P.M.	30 grams of panopepton	57.5
		2024.5

SUMMARY

FACTORS INDUCING GASTRIC DISTURBANCES

1. **Errors in Diet.** — Overfeeding, underfeeding, improper food, unbalanced diet.

2. **Disturbed Secretory Processes.** — (*a*) Over- or under-secretion of gastric juice.

(*b*) An excess or deficiency of hydrochloric acid in the juices.

3. **Impaired Motility and Tone of the Gastric Organ.** — The peristaltic waves and muscular contraction of the stomach walls becoming sluggish prevent the food mass from passing into the intestines at a normal rate of speed, thus giving rise to a fermentation of the food and a consequent dilatation of the organ from the gas thus produced.

Other Factors. — Lack of fresh air and exercise, indoor occupation, bad hygiene, unsanitary surroundings, heredity, certain diseases which are accompanied by gastric disorders.

Prophylaxis. — Change mode of living, take more exercise, regulate diet, prevent if possible the development of gastric ulcers.

ACUTE GASTRITIS

Absolute Quiet. — In bed, when pain is acute and temperature elevated.

Treatment. — No food for from twelve to thirty-six hours or more:

(*a*) To allow offending material to pass out of the body;

(*b*) To determine the cause of the attack;

(*c*) To allow the inflamed organ to rest.

Dietetic Treatment. — Fluid diet after period of total abstinence: well-strained fat-free meat broths, albumen water, peptonized milk. Whole milk in many cases is to be avoided on account of the tough curd formation in the stomach; in other cases milk forms the chief article of diet and is modified or peptonized to meet the requirements of the individual.

Convalescent Diet. — The diet is increased by adding eggs, soft toast, cereal, gruels, rice, etc., later beefsteak, lamb chops, etc., until the normal diet is reached.

Precautions. — Patient warned against overeating or eating foods known to disagree:

(1) Because each attack lessens the ability of the organ to readjust itself to normal conditions;

(2) On account of the danger of the condition becoming chronic;

(3) Because of the danger of the development of gastric ulceration.

CHRONIC GASTRITIS

Test Meal. — An analysis made of stomach contents after test meal to find the cause and extent of the disorder.

Treatment. — Remove cause:

(1) By adjusting the diet to meet the needs superinduced by the chief symptom, namely: hypersecretion, or by hyposecretion of gastric juice, the acid content particularly, thus preventing the

development of ulcers, and by stimulating or retarding the peristaltic movements in the organ, as the case may require;

(2) By regulating the mode of living:

(*a*) Increasing the amount and kind of exercise;

(*b*) Improving the hygienic and sanitary surroundings;

(*c*) Changing, if necessary, the type of occupation.

Accompanying Complications. — Anemia due to a prolonged interference with the nutrition of the blood-making tissues; ulceration in many cases caused by the constant bathing of the tender mucous linings of the stomach walls with a highly irritating acid medium produced by a hypersecretion of HCl; or to the action of bacteria producing fermentation of carbohydrate food, sugar in particular; or to impaired motility which, by delaying the passage of food from the stomach, favors the development of organic acids.

Dietetic Treatment. — Practically the same as in acute gastritis. The simplest kind of foods only is advised; articles known to disagree should be avoided; the meals should be regular and of moderate size. When the chief symptom is hypersecretion of acid, foods which require more acid for their digestion, namely, the proteins, are advised, with enough carbohydrates and fatty foods to balance the diet. When there is evidence of a deficiency in HCl, foods requiring less acid for their digestion and those which will leave the stomach in the shortest possible time, namely, carbohydrate foods, should be given. These must be judiciously selected on account of their susceptibility to fermentation. Thus the starches, rather than the sugars, are advised under the circumstances.

The Bowels. — In any gastric disturbance it is most essential to keep the bowels open. Foods containing an appreciable amount of cellulose to increase their bulk, such as bran bread, prunes, etc., assist in this process. Certain fruits, oranges, lemons, and limes, as well as figs and raisins, likewise exert a laxative effect, and for this reason are particularly good in many gastric disturbances to keep the intestinal tract free from accumulating food materials.

GASTRIC ULCERATION

Test Meal. — As advised in cases of chronic gastritis, to determine the cause of the prevailing condition.

Treatment. — Divided into three stages:

(1) **Hemorrhage Stage** requires rest in bed, total abstinence from food and water for a period varying from twenty-four hours to a week or even more in severe conditions.

(*a*) **Rectal Feeding.** — Nutrient enemas are given when emaciation and anemia are pronounced; saline enemas are given to relieve thirst during period of total abstinence.

(*b*) **The Bowels.** — It is necessary to keep the bowels open to keep the body in good condition, a cleansing enema generally preceding the nutrient enema each morning.

(2) **Intermediate Stage.** — After the total abstinence treatment.

Dietetic Treatment. — Fluid diet; milk is the universal food during this period — it is peptonized or not according to the direction of physician.

Milk Diet. — Peptonized milk in quantities, beginning with four ounces given every hour for three or four days, after which the amount of milk is increased to six ounces and the intervals between feedings lengthened to two hours. This régime is carried out for from seven to ten days.

Reënforcing and Varying the Diet. — The monotony of milk mitigates its usefulness; in some cases this may be overcome by adding to the dietary a cup of well-skimmed meat broth, reënforced by the addition of an egg, once or twice a day.

Third Week. — Milk given in form of milk soup, which may be thickened with rice, barley flour, or farina. Meat extracts are stimulating to the secretory cells of the stomach, hence, in cases accompanied by hyperchlorhydria, it is advisable to flavor soups sparingly with these extracts. Water is one of the best known stimuli to gastric secretion and for this reason the amount given by mouth must be limited. The mouth must be cleansed several times a day, but none of the water swallowed unless permitted by the physician.

(3) **Convalescent Stage.** — During the fourth week, if patient's condition warrants an increase in diet, the foods used in acute and chronic gastritis, namely, soft eggs, well-cooked wheat cereals, rice, soft toast, slightly sweetened custards, junket, and ice cream, are given in small quantities. An immediate return to the milk diet must be made if patient shows a tendency to develop acute symptoms.

Fourth Week. — Meat, as advised in after-treatment of acute gastritis; the vegetables, consisting of spinach, tender green peas and beans and young carrots, must be thoroughly cooked and passed through a sieve — a small portion of one of these vegetables to be given once a day.

Fats in Gastric Ulceration. — Fats cause much discomfort in many cases and must be added to the diet with caution, butter being the best form in which to give the necessary fat to balance the diet.

Fermented Milk. — Buttermilk, koumiss and other forms of fermented milk are particularly valuable in these cases, but cannot, on account of their composition, be given to the exclusion of whole milk.

Bland Diet. — Farinaceous foods, farina, arrowroot, cream of wheat, and other finely ground wheat and corn cereals made in form of gruels.

Proprietary Infant or Invalid Foods. — These foods may require pre-digesting with diastase. This diet is used for those individuals showing an idiosyncrasy against the milk diet. It cannot be prolonged on account of its lack of balance. It is at times substituted for the milk diet when the case has proved lengthy and the patient becomes tired of milk.

Stomach analysis and urinalysis are made from time to time throughout the course of the disease.

GASTRIC CANCER

Treatment. — Rest in bed when condition is extreme.

Dietetic Treatment. — Small meals given at frequent intervals rather than the regulation three meals a day, as the pressure from the larger quantity of food in the stomach causes discomfort.

Milk in this condition, as in other gastric disturbances, forms the chief article of diet. It may be peptonized or modified if necessary.

Meat is often distasteful and cannot always be given. When it is included, it is given in the form of boiled or broiled sweetbreads, brains, stewed chicken, or scraped beef. It is often necessary to substitute fish.

Convalescent Diets used in other gastric disorders are used for patients having cancer of the stomach.

Reënforcing Agents are at times valuable. These may consist of some of the prepared beef preparations, such as panopepton or somatose. Milk gruels are also useful.

The free hydrochloric acid content of the stomach in such conditions is generally low or lacking entirely, consequently the food mass is subject to fermentation. This is both from the lack of the germicidal quality of the gastric juice and the impairment in the motor process which is almost an invariable accompaniment.

CHAPTER XIV

DISEASES OF THE INTESTINAL TRACT

ACUTE AND CHRONIC DIARRHEA (CATARRH), ENTEROCOLITIS, DYSENTERY, CONSTIPATION, APPENDICITIS, CHRONIC CONSTIPATION, AUTO-INTOXICATION

DIARRHEA, like gastritis, may be a symptom of many diseases and a result of many digestional disturbances. Enteritis, enterocolitis, dysentery, typhoid fever, and certain cases of tuberculosis and syphilis are all accompanied by an inflamed condition of the mucous linings of the intestinal walls, and in each of these pathological conditions we may find diarrhea as a resulting symptom.

Causes. — Diarrhea may be acute or chronic in character. It may be brought on by errors in diet, warm weather, certain drugs, ptomaines, bad hygiene, polluted water or milk, and by overeating. Idiosyncrasies against certain kinds of food have been found in both adults and children; these idiosyncrasies are manifested by pain and diarrhea whenever the offending foods have been eaten. Acute diarrhea has also been brought on in children by the drinking of cold lemonade when overheated.

Diarrhea in Children. — All diarrheas in children, and especially those developing during the hot months, must be looked on with suspicion and given immediate attention before they have an opportunity to develop serious features which may terminate in death before the seriousness of the condition is realized.

As a rule, almost any diarrhea in children will raise the temperature. This does not occur so often with adults unless the diarrhea results from infectious fevers, ptomaines, etc., in which case it may rise suddenly and to a considerable height.

ACUTE ENTERITIS (DIARRHEA)

The Bowels. — The symptoms of this condition are too liquid or too frequent stools, the number varying from three to twelve or more a day. They may be greenish yellow in color and contain particles of undigested food and mucus. In prolonged diarrheal attacks the stools sometimes contain blood.

The attack may be accompanied by more or less pain of a colicky nature, due to the formation of gas in the intestinal tract. In ptomaine poisoning this pain is sometimes very intense. As a rule the intestinal tract is emptied by means of salts, oil, etc., but this is generally directed by the physician. A soapsuds or salts and glycerine enema to flush the colon will often give quick relief by dispelling the gas.

Starvation. — The entire digestive tract requires absolute rest for a certain period; no food and very little water, the latter in the form of bits of ice only, are given for a period lasting from twelve to thirty-six hours or more, depending upon the violence of the attack and the condition of the patient. This is to allow the toxic substances which are probably causing the disturbance to pass out of the body, either in the feces or in the urine. When the acute symptoms subside, that is, when the pain and distention of the intestines have disappeared, and the bowel movements become more normal in number and character, the dietetic treatment suitable to the condition is instituted.

Dietetic Treatment. — The first day the patient is given a small cup of weak tea, half a glass of buttermilk or peptonized milk, or a cup of well-skimmed meat broth, every three or four hours. If the patient is weak, the nourishment may be given oftener, and in those cases it is often found advisable to give a small amount of alcohol in the form of brandy in albumen water, or panopepton or liquid peptonoids. These may be administered in tablespoonful doses every two hours. Whole milk, unless it is peptonized, and at times even then, is not advisable in diarrheal conditions on account of its liability to form curds which decompose with the production of toxic substances, known to be exceedingly irritating

to the already inflamed mucous membranes lining the intestinal walls.

Increasing the Diet. — As the diarrhea and inflammation subside, the following foods are gradually introduced into the dietary, keeping in mind always that a return of the acute symptoms is apt to occur. Hence the patient must never be overfed. It is better to err on the side of too little than too much food during the early convalescent period.

Diet. — Soft-cooked eggs, toast (slightly buttered), cocoa made with water instead of milk, chicken, calf's foot or wine jelly; later, well-cooked rice, junket, and soft custard; still later, lightly broiled beefsteak, lamb chops, chicken, squab or quail, sweetbreads or brains. Not until the patient is entirely free from all symptoms of diarrhea or intestinal disturbance may the following foods be given: cream or cream dishes such as cream toast, cream chicken, or cream soup, raw or stewed fruit, green vegetables, salt foods, spiced foods of any description, pastries, confectionery and desserts in general, unless they are simple in character and are sweetened with saccharine instead of sugar, as the latter substance is particularly susceptible to fermentation.

Anemia as a Result. — Anemia is one of the most common results of prolonged diarrheal attacks, especially in those toxic diarrheas resulting from infectious diseases, dysentery, etc. The blood-making tissues suffer from a lack of nourishment and are in consequence incapable of producing blood of the best quality. Hence the starvation treatment cannot be carried on over a very extended period or the resulting anemia may be more difficult to overcome than the original trouble.

Selecting and Regulating the Diet. — The following points must be kept in view when regulating the diets of individuals who are prone to develop diarrhea:

Preparing the Diet. — Only such foods as are known to agree with the individual, and these prepared in the simplest manner possible, must have a place in the dietary.

Fermentation. — All foods that are subject to fermentation either in the stomach or intestines must be withheld, at least until

the attack is well over. Sugar is an example of such foods; saccharine may be substituted when necessary.

Avoidable Foods. — Pork, veal, and shellfish must be left out of the dietary, possibly for months, since they have been found frequently not only to bring about a return attack of diarrhea but also to have been the cause of the original one.

Fatty foods of all sorts had best be avoided as long as there are symptoms of diarrhea; these foods are handled with difficulty by the digestive apparatus and impose extra work upon the intestine, which is already taxed by the disease.

Restricting Fluids. — Fluid foods should be more or less limited in the diet, since they require more effort on the part of the intestines than the more concentrated foods.

Proprietary Foods. — Certain proprietary infant foods [1] are at times found to be exceedingly valuable, since they furnish food in a concentrated and digestible form. Among these Mellin's Food, Racahout, and Imperial Granum may be mentioned.

CHRONIC ENTERITIS

The Stools. — When the diarrhea is chronic in character, the character of the stools indicates the seat of the inflammation. When there is a great deal of undigested food found in them the upper part of the bowel is more affected; when the stools contain more mucus than food the lower bowel is the chief seat of the trouble. The frequency and fluidity of the stools impose a great strain upon the entire body, causing a progressive emaciation and anemia.

The treatment is similar to that instituted in acute attacks. The starvation régime cannot be carried out for a long period. Efforts must be made to ascertain the cause of the trouble and to overcome it. This is, as a rule, more easily accomplished with adults than with infants and children.

Dietetic Treatment. — The diet is the chief point of observation and attention. The same care must be observed as is found necessary in the after-treatment of acute diarrhea. The patient

[1] Malted foods are contraindicated, as malt exerts a very laxative effect.

must be cautioned not to eat indigestible foods or those which are known to cause trouble in this respect. She must be warned against eating when over-tired.

ENTEROCOLITIS

Enterocolitis is an inflammation of the lower intestines and colon. The stools contain more mucus than those occurring when the inflammation is higher up in the intestines and blood is also more frequent in these stools. The prostration is more marked and the fever apt to be higher than in ordinary diarrheal attacks. However, acute attacks of enterocolitis do not produce the marked anemia or the emaciation which are so common in the chronic cases of enteritis.

Dietetic treatment the same as that used in acute diarrhea.

ACUTE DYSENTERY

Dysentery is a disease in which the seat of inflammation is the colon. The bowels are distended and tender, the pain at times is acute and spasmodic, and the fever moderate. The constant desire to defecate and the straining which accompanies each effort, as well as the small stools, containing both blood and mucus, furnish the characteristic symptoms of this disease. Rest in bed is absolutely necessary; the patient must be induced to use a bedpan.

Dietetic Treatment. — The diet consists entirely of liquids as in acute diarrhea, the same careful régime being observed as in those conditions. The soreness in the abdomen is at times relieved by spice poultices or a hot turpentine stupe.

CHRONIC DYSENTERY

When the above conditions become chronic, the patient loses weight and strength rapidly, becomes anemic and emaciated. The treatment, like that used in the acute disease, consists of rest and liquid diet. The medicinal treatment is left entirely in the hands of the physician.

APPENDICITIS

Appendicitis is an inflammation of the vermiform appendix. It may be acute or chronic in form.

Symptoms. — The disease is manifested by sudden pain in the right side, tenderness over the seat of the inflammation, and a localized rigidity of the right iliac fossa. The attack is as a rule accompanied by fever which may run as high as 103° or 104° F. The patient may suffer from nausea and vomiting. Constipation is generally an annoying symptom of the disease.

Rest in Bed. — The treatment of the acute attack consists of total abstinence from food for twelve or more hours until the most acute stage has passed and the patient either passes into the hands of the surgeon or the symptoms begin to subside in violence. It is necessary that the patient be kept in bed, not being allowed to rise for anything. The nurse must make him understand that his recovery, possibly his very life, depends upon his absolute quiet during the early stages of the disease.

Dietetic Treatment. — When the first acute symptoms have passed, the diet must consist of fluids, well-skimmed meat broths, buttermilk, peptonized milk, albumen water or albumenized orange juice. No solid food must be given until the acute symptoms have disappeared. When the tenderness in the right side has entirely left him and he no longer suffers the pain or nausea, a gradual return to a normal diet may be made. The patient must be cautioned against eating indigestible foods, as an attack of intestinal indigestion may readily start up an irritation in the susceptible appendix and cause a second attack of appendicitis which is often of a more serious nature than the first.

Convalescent Diet. — The return to solid food is made gradually as in other intestinal disorders, by giving the most digestible foods first. Soft toast, soft eggs, fine cereal gruels, well-cooked rice, well-baked white potatoes, meat, wine or fruit jellies; then lightly broiled beefsteak, lamb chop, chicken, sweetbreads, or brains given in small quantities until the intestinal tract has regained its vigor.

Foods to Be Avoided. — Highly seasoned foods must be avoided on account of their astringent qualities, which may cause constipation. Long, tough-fibered meats, coarse vegetables, rich foods, in fact anything which may cause intestinal indigestion, must be eliminated from the dietary. A decomposition of the foods lying in the lower part of the small intestine is dangerous to such individuals, since such products are highly toxic in character and exceedingly irritating to the already tender appendix.

CHRONIC CONSTIPATION

Chronic constipation is so universal a condition that it must be treated and overcome whenever it is possible. This condition is not only the cause but the result of disease. It may be induced by improper food, poor hygiene, sedentary habits, lack of exercise, the taking of drug preparations such as cough sirups which contain opium in some form, the constant taking of cathartics and enemas, or it may be an hereditary condition.

Diet, Exercise, and Fresh Air. — The chief means of overcoming this deplorable chronic condition is by regulating the diet and increasing the amount of exercise in the fresh air.

At times it is necessary to resort to artificial stimulation of the intestinal movements; at others, on account of the disease of which it is only one of the symptoms, it is dangerous to irritate the already inflamed mucous membranes lining the intestinal wall. In these cases the physician prescribes the method of procedure. In ordinary cases, however, the following suggestions may be used as a guide in overcoming the condition.

Available Foods. — It must be borne in mind that the food must not be too concentrated in character or it will be so completely absorbed as to leave little or no residue for the feces, and since the waste products of metabolism, both of food and body materials, must be eliminated, a certain amount of fecal matter is necessary to assist in this work. Vegetables, such as celery, turnips, lettuce, asparagus, string beans, spinach, and beans, lentils, lima beans, and onions; fruits, such as raisins, figs, and prunes; and cereals which have not had all the bran removed, such as cut oats, cracked wheat,

etc., on account of the cellulose they contain, act admirably in overcoming chronic constipation. It is found, however, that when even these are not sufficient in certain cases, bran added to the food, either alone, with the breakfast cereal, or in the form of biscuits, muffins, or cookies, will give just the necessary amount of ballast to the food mass to make it stimulate the peristaltic movements by its pressure upon the intestinal walls.

Stimuli to Peristalsis. — Foods yielding certain acids exert a stimulating action upon intestinal peristalsis.

Available Foods. — Those particularly valuable for this purpose are limes, oranges, apples, prunes, figs, raisins, and most fruit juices (with the exception of blackberries, which are constipating), tomatoes, and rhubarb. The fruit juices may be diluted with water or carbonated water (in the latter case the action is increased because of the gas contained in the water), and taken the first thing in the morning, or the fruit may be eaten at night before retiring, and in the morning on an empty stomach. Prune pulp or prune jelly may be given to children as well as to adults. The action of this fruit is augmented by the addition of senna leaves.[2] A conserve made of prunes, figs, and raisins given in teaspoonful doses at night and before breakfast often gives splendid results in curing chronic constipation.

Gas-forming Foods. — The eating of foods which give rise to a slight formation of gas owing to their tendency to ferment likewise acts as a stimulus to intestinal movements. Among these may be mentioned honey, molasses, cauliflower, cabbage, spinach, and onions. If the honey and molasses are poured on bran muffins or biscuits, on breakfast food, or added as sweetening agents to cookies, they will be found particularly valuable. Care must be taken, however, not to give too much of either of these foods or they will disturb the digestion and do more harm than good.

Use of Salt Foods. — Foods such as herring, caviar, anchovies, ham, etc., on account of the salt they contain, exert a stimulating effect upon the movements in the small and large intestines. Graham bread, spread with brown sugar, molasses, or honey, makes

[2] See Formula at end of chapter.

an acceptable addition to the meal of the majority of children and to that of many adults.

Fats and Mineral Oils. — The use of fats is often recommended; olive oil may be given in tablespoonful doses before breakfast and at night or it may be served on vegetables and salads. If one or two tablespoonfuls are taken at night and before breakfast, it may act as a laxative. In many cases, however, this oil is completely absorbed in the small intestine and hence there is none left to lubricate the passage for the food mass. When vegetable oils do not prove satisfactory, mineral oils may be substituted. These oils have absolutely no fuel value and are not digested in the intestinal canal but mix with the fecal mass, softening it and stimulating its passage through the large intestine. There are certain individuals with whom the mineral oils do not act as lubricants and instead of softening the feces and lubricating the passage will slip through the intestinal canal without carrying the feces along.

Sample Diet Sheets. — The following menus are suggested for the use of individuals suffering with chronic constipation:

7 A.M. Orange juice and water.

8 A.M. 1 bran muffin with honey and cream.
1 or 2 slices of bacon.
Whole wheat biscuits.
A cup of coffee, cereal coffee, or hot milk (not boiled).

LUNCHEON

1 P.M. Casserole of beef made with lean beef.
Turnips and potatoes.
Graham bread or muffins and honey or preserves.
Milk or "hot water" tea.

DINNER

Tomato bouillon.
Roast lamb.
String beans.

Potatoes baked with jackets on.
Celery salad, dressed with plenty of oil and lemon juice.
Prune jelly with whipped cream.

BREAKFAST

Prunes and figs cooked together.
Slice of ham with 1 soft-cooked, poached, or scrambled egg.
Whole wheat or bran biscuits.
Coffee with cream and sugar.

LUNCHEON

Vegetable soup.
Pork and beans.
Boston brown bread.
Baked apple (skin eaten).
Oatmeal wafers.

DINNER

Roast beef.
Spinach or cauliflower served with butter sauce.
Cold slaw.
Pineapple jelly (pineapple left in), whipped cream, or
Date and fig pudding.

AUTO-INTOXICATION

Auto-intoxication is a condition produced by the absorption of the decomposition products of food in the intestinal canal.

Absorption of Toxins. — As a rule the condition occurs in individuals suffering more or less from constipation which may be due to errors in diet or a lack of tone in the intestines, giving rise to a sluggishness in the peristaltic movements in this region of the alimentary canal. In certain individuals the liver is more or less sluggish, or in some way fails to do its regular work of detoxifying the products of metabolism brought in by the blood stream, in which case these toxins are reabsorbed into the system and induce a condition known as auto-intoxication.

Care of Bowels. — As a rule the patient has more or less fever, nausea and at times vomiting. The head aches and the abdomen may be distended by the formation of gas in the intestines. The treatment is like that used in the majority of intestinal disorders. The bowels are emptied by means of soapsuds or salts and glycerine enemas. Certain physicians recommend an enema made with equal quantities of milk and molasses, with enough hot water added to make a thin, warm solution. Care must be used in preparing this flatus enema on account of the danger of curdling the milk with the acid in the molasses and the hot water. If the solution should curdle it must be discarded and a fresh solution prepared. A flatus enema containing salts, glycerine, and a few drops of turpentine is also valuable in removing the gas formed by the action of the putrefactive bacteria upon the unabsorbed food mass. This enema must be given " high " so as to reach the spot in the colon where it may efficiently do its work.

Dietetic Treatment. — The diet may consist of fluids for the first few days, or as long as the fever continues. **Buttermilk** is probably the best fluid food to use under such conditions, since it not only nourishes, but likewise furnishes lactic acid bacteria which aid in the destruction of the more harmful bacteria, especially numerous under the conditions just mentioned. When whole milk is given it is best to peptonize it. Well-strained meat broths may be given occasionally to vary the diet and albumenized orange juice or orange juice in carbonated water may also be given once or twice daily during the febrile period. After this, the patient may have well-cooked cereal gruels. These may be dextrinized with vegetable diastase (Taka diastase) if necessary. A return to normal diet is made gradually to prevent a return of the trouble. The patient should be advised against overeating, and eating highly seasoned or indigestible foods.

Convalescent Diet. — The diets recommended for use during convalescence from other intestinal disorders may serve here, reducing, however, the allowance of meat, since meat proteins are particularly susceptible to attacks of putrefactive bacteria.

Dietary Precautions. — After the body has returned to its

normal state, the patient must keep in mind the danger arising from constipation and intestinal putrefaction. The following menu is given as a guide to aid the individual in selecting a diet which will in a measure assist in preventing future attacks of intestinal putrefaction and auto-intoxication:

7 A.M. 1 glass of water with orange or lime juice.

BREAKFAST

8 A.M. Stewed prunes or figs.
Cereal and cream.
Buttered toast.
Crisp bacon.
Coffee.

LUNCHEON

Vegetable or tomato soup.
Green vegetables such as cauliflower, greens, or tomatoes; or
Baked dishes such as macaroni and cheese, scalloped macaroni and tomatoes; or
Baked potatoes or potatoes *au gratin* or stuffed tomatoes with rice.
Stewed fruit or fruit jelly.
Sponge cake with simple sauce.
Junket.
Toasted crackers or bread.

DINNER

Milk soup.
Cream of spinach, celery, peas, or tomatoes.
Baked eggs, cheese soufflé or nut loaf.
Tender green peas, cauliflower, spinach, boiled or creamed potatoes, well-boiled rice.
Fruit, vegetable, tomato, or cheese salad.
Simple dessert, such as cottage pudding with simple sauce, fruit pudding, prune whip, or frozen desserts: ice cream or water ices; or
Cheese and crackers.
Coffee.

SUMMARY

DIARRHEA

Character. — Acute or chronic, accompanying many pathological conditions, especially in children in whom diarrhea in any form must be given immediate attention.

Causes. — Errors in diet, polluted water or milk, ptomaines, bad hygiene, and certain drugs.

Bowels. — The stools vary in number from three to twelve a day. They may be greenish yellow in color, containing mucus and particles of undigested food and, in prolonged cases, blood.

Treatment. — Rest in bed and total abstinence from food for from twenty-four to forty-eight hours. Salines are usually given by mouth or by rectum, but this is left to the discretion of the physician. Very little water is given by mouth during the period of total abstinence. Thirst is relieved by bits of ice, and enemas are given if necessary.

Administration of Diet. — When acute symptoms have disappeared and the stools are becoming more normal in character and number, a fluid diet of from four to six ounces is administered every three or four hours or oftener if patient is very weak. Brandy may likewise be given in cases in which exhaustion is marked.

Dietetic Treatment. — Concentrated foods of the simplest character and only those known to agree. Proprietary infant or invalid foods, except malted foods, which exert a laxative effect; among those found to be good may be mentioned Mellin's Food, Imperial Granum, and Racahout.

Foods to Be Avoided. — Fatty foods; pork, veal, and shellfish; all foods that are subject to fermentation in the stomach or intestinal tract (sugar).

Foods to Be Limited. — Fluids, soup, beverages, etc., because they impose more work on the intestines.

ENTEROCOLITIS

Seat of Inflammation. — Lower intestine and colon.

Differentiating Characteristics. — More mucus and blood in stools; greater prostration; greater rise of temperature; and less anemia than in chronic enteritis.

Dietetic Treatment. — Practically the same as in other diarrheas.

DYSENTERY

Characteristic Symptoms. — Acute and spasmodic pain, tenderness and distention in the bowels, moderate fever, straining and a constant desire to defecate, small stools containing blood and mucus, loss of weight and marked anemia when condition becomes chronic.

Treatment. — Rest in bed absolutely necessary; the use of the bedpan made obligatory; soreness relieved by hot turpentine stupes or spice poultices.

Dietetic Treatment. — No food for a period of from thirty-six to forty-eight hours, after which fluids and the régime recommended in acute diarrhea are advisable. In chronic dysentery the diet is practically the same. The extreme exhaustion and anemia accompanying these conditions make it necessary to increase the diet carefully but soon to offset as far as possible the devastating effects of the disease.

APPENDICITIS

Treatment. — Confinement to bed is absolutely necessary while acute symptoms prevail. The life of the patient may depend upon the care with which this "quiet" period is carried out. No food should be given for twelve or more hours to enable the physician to make a proper diagnosis and to allow the intestinal tract and appendix complete rest from the irritating effects of food passing down the canal.

Dietetic Treatment. — **Acute Stage**: Total abstinence for a period, after which fluids as given in other acute intestinal disorders. No solid food until acute symptoms have subsided; then a gradual return to normal.

Convalescence: When tenderness in right side has disappeared, the return to a normal diet is made gradually. Gelatine, soft eggs, soft toast, fine cereal gruels, well-cooked rice, well-baked white potatoes, tender rare beefsteak or lamb chops, the breast of chicken, sweetbreads, and brains are recommended.

Relapse or Recurring Appendicitis. — The patient must be warned against eating indigestible foods or any kind of foods liable to cause constipation; also against overeating or eating when over-heated or over-tired. One attack predisposes to another, hence the above precautions are necessary to prevent the condition from becoming chronic.

CHRONIC CONSTIPATION

Causes. — Improper foods, indoor occupations leading to a lack of fresh air and exercise, bad hygiene, certain drugs, such as cough sirups, etc., containing opium in some form, constant use of cathartics and enemas to move the bowels, heredity.

Dietetic Treatment: Foods to Be Avoided. — Highly spiced foods must be avoided on account of their astringent qualities, too concentrated foods because they fail to furnish the necessary bulk without which the waste matter cannot pass out of the body at a sufficient rate of speed to prevent putrification taking place in the intestinal tract.

Foods Stimulating Peristalsis on account of their bulk: Bulky foods, such as vegetables, cabbage, turnips, cucumbers, spinach, beans, celery, lettuce, etc.; cereal foods containing a high percentage of bran, bran bread and cookies, fruits such as raisins, prunes, figs.

Foods Acting as Stimuli to Intestinal Movements on account of their acid content: Limes, oranges, apples, prunes, figs, raisins, most fruit juices (blackberries excepted), rhubarb, tomatoes, cauliflower, spinach, onions, honey, and molasses; senna leaves likewise have a distinct action upon the peristaltic movement of the intestines, hence are included here.

Precautions. — Emphasis should be placed upon the dangers of (1) overeating any of the foods indicated in the above list and thus bringing about conditions more dangerous in result than the original

disturbance; (2) the taking of drugs to move bowels on account of the ease with which the habit is acquired and the consequent inability of the bowels to move without such whips; (3) the taking of too little water, thereby allowing a too concentrated condition of the food mass and a consequent accumulation of substances which inhibit peristaltic action.

Use of Fats and Mineral Oils. — Olive and other vegetable oils, if not completely absorbed, are advised on account of their lubricating effects. The same can be said of the mineral oils which have no food value but in many cases furnish the lubricant necessary in certain individuals suffering from sluggish intestinal peristalsis.

FORMULAS VALUABLE IN COMBATING CHRONIC CONSTIPATION

Prunes

Prunes should be cooked slowly, the sugar added after the fruit has cooked for an hour or more. One ounce of senna leaves added to a pound of prunes will increase the laxative effect of the fruit.

Prune Pulp

8 prunes; enough water to cover; 1 teaspoonful of senna leaves; soak prunes for several hours or overnight. Cook for two hours, very slowly; add senna leaves and cook 1 hour or more. Lift the prunes from the juice, remove pits; press through a sieve; if not sufficiently sweet, add more sugar. Stir in enough of the juice to make the pulp soft. This may be served with cream or beaten into one well-beaten egg white.

Prune Jelly

8 prunes
1 tsp. senna leaves
1 pt. water
2 tbs. or more sugar
2 tsp. lemon juice or a few drops of vanilla
2 tsp. granulated gelatine soaked in 2 tbs. water.

Cook prunes until tender, adding the senna leaves the last hour. Strain juice and add enough hot water to make cupful if there is

not that quantity left after cooking the prunes. Sweeten juice, add lemon juice and gelatine; return to fire; allow to boil up; strain into a glass bowl and place on ice.

Prunes and Figs

½ lb. each prunes and dried figs
1 oz. senna leaves

Boil from 2 to 3 hours as directed in preparing prunes as above. Lift fruit from hot sirup, place in quart jar, strain the juice and pour over the fruit. Use as needed.

Conserve

⅓ lb. prunes (pits removed) ⅓ lb. figs
⅓ lb. raisins (seeded) 1 oz. senna leaves

Boil prunes just enough to allow of the pits being removed. Cool and pass with the senna leaves, figs and raisins through the food chopper. After passing through once return to chopper and pass through a second time. See that the senna leaves and fruit are thoroughly mixed and finely chopped. Place in a quart jar and give in doses of from 1 to 2 teaspoonfuls night and morning.

Bran Muffins or Gems

1½ cups bran ½ tsp. soda
2 tbs. molasses ½ cup milk
½ tsp. salt 1 egg

Sift soda and salt into bran; stir milk into molasses and add to bran. Mix in the milk, beaten egg. Bake in greased muffin pans.

Bran Gems

1½ cups bran 2 tbs. melted butter
1 tbs. sugar 1 tsp. baking powder
1 egg 1 tsp. salt

Mix and bake in six greased gem pans.

Bran Gems

1 cup bran
1½ cups wheat flour
2 tbs. butter or lard
1 tsp. salt
1 cup milk
1 egg
6 prunes [3]

Mix thoroughly. Pour the gem pans half full; place a large prune in center of each. Fill cup with batter and bake.

Bran Cookies

½ cup wheat flour
1 cup bran
½ cup molasses
½ cup milk
¼ cup butter (or butter and lard mixed)
1 tsp. cinnamon
½ tsp. nutmeg
½ tsp. cloves
2 eggs
¼ tsp. salt

Cream butter and sugar together, sift salt and spices into the flour and bran. Add eggs and milk to sugar and butter, beat into the bran mixture. Drop from spoon on to a well-greased paper. Bake in a quick oven.

Oatmeal Cookies

2 cups flour
¼ cup sugar
½ cup milk
½ cup oatmeal
2 tsp. butter, lard, or Crisco
1 cup seeded raisins
1 egg
½ cup shelled peanuts

Mix shortening and sugar together. Mix oatmeal and peanuts (broken into small pieces) into the flour. Add milk and well-beaten egg, then the raisins; mix into a dough, roll into a thin sheet, and cut into small cakes. Bake in quick oven.

[3] The prunes must be cooked until tender, not soft, before placing in muffins.

CHAPTER XV

TYPHOID FEVER

Definition. — Typhoid fever is an acute infectious disease excited by specific bacteria (Eberth). The intestines become the seat of ulceration (Peyer's patches), which at times perforate. The chief symptoms of the disease are fever, headache, abdominal distention and tenderness, more or less diarrhea and a rose-colored abdominal rash. The source of infection is found in the intestinal contents of a typhoid fever patient, which in some way come in contact with and infect drinking water, milk, etc.

Energy Expenditures in Febrile Conditions. — In febrile conditions the energy expenditures increase as much as twenty-five per cent in some cases, and when bacterial activity is added to this, as is the case in typhoid fever, the tissue waste becomes correspondingly greater; hence the nutrition assumes the chief rôle in such cases, for in no other way can the tissue waste and energy expenditure be met and overcome.

Energy Expenditures in Typhoid. — In typhoid fever the problem of meeting these expenditures, and at the same time protecting the heart and kidneys from the abnormal strain placed upon them in handling the toxic substances produced as the result of bacterial action in the intestines, becomes very real. It requires eternal vigilance and patience not only from the physician but especially from the nurse, with whom so much responsibility rests. The dietetic treatment necessarily is the principal point to which all efforts must be directed. By this is understood not only the type and amount of food given the patient, but the behavior of this food in the body as manifested by the symptoms, namely, the appearance of the patient, the condition of the mouth, the abdominal distention, tenderness, diarrhea, nausea, and vomiting, the hemorrhage which at times occurs in spite of all care, and

perforation which sometimes results in death, and acidosis or acetonuria. All of which makes this disease one requiring the most efficient attention from a nutritional standpoint.

Energy Requirements in Typhoid Fever. — In a previous chapter the energy expenditures of the normal individual were dealt with; it was seen that a man at rest, that is, in bed, not rising for anything, had a normal expenditure of energy requiring from 1900 to 2200 calories per day. Now, if these expenditures were increased twenty-five per cent by the fever and still more by the bacterial activities, it is clearly seen that the diet must be increased in proportion if the tissue waste is to be prevented and the normal body weight of the patient maintained.

High Calorie Diet. — Dr. Warren Coleman,[1] to whom we owe so much for his pioneer work in feeding in typhoid fever, devised the so-called "High Calorie Diet." This consists of foods of the most digestible type prepared in the simplest way. The weight of the patient is considered and the diet directed with the following points in view: (1) to cover the energy requirements of the body; (2) to make good the tissue waste which at times amounts to a loss of from 15 to 20 grams of nitrogen a day (or from $\frac{1}{4}$ to $\frac{3}{4}$ pound of muscle);[2] (3) to check or prevent the development of serious complications, kidney, heart, etc.

In the Metabolism Ward at Bellevue Hospital, New York,[3] the best results are obtained by the giving of diets furnishing from 60 to 80 calories per kilogram per day, or from 4000 to 5500 calories.

Fluid Diet. — It is clearly seen that it would be practically impossible to obtain a sufficient number of calories by using milk alone or even a mixed fluid diet to supply the above requirements. Since milk alone in such a diet would probably cause such discomfort as to make it unwise to continue it, the ideal diet would

[1] Warren Coleman, Cornell University Medical College, Visiting Physician, Bellevue Hospital, New York City.

[2] "Diet in Typhoid Fever," by Warren Coleman, "Journal of American Medical Association," Oct. 9, 1909, Vol. LIII.

[3] "Diet in Typhoid Fever," by Warren Coleman, reprint from "Journal of American Medical Association," June 9, 1909.

seem to be one in which the fats, proteins and carbohydrates are furnished in a semi-solid or solid form, together with a sufficient amount of liquids to prevent too great concentration in the food, to relieve thirst, and to act as a carrier of reënforcing substances, such as lactose, eggs, casein products, etc.

Absorption Food. — The question as to whether the food is absorbed when given to typhoid fever patients has often been asked. That it is has been proved in the series of calorimeter experiments conducted in the Metabolism Ward, Bellevue Hospital.[4] Here it was demonstrated that under the high calorie diet the patient consumed large amounts of food with relish and that which was not utilized by the organism immediately was stored for future needs.

Diarrhea and Tympanites. — Constant attention and study of various typhoid patients taking a maximum amount of food a day has proved that the diarrhea and tympanites which at times occur in these as well as other cases are due to too much of one or another of the food constituents rather than to the general amount of the diet. Diarrhea may then be traced to an excess of cream, and the tympanites to an excess of lactose, and a reconstruction of the dietary will often obviate the trouble.

Increasing the Diet. — It is always advisable to "go slow" in adding new foods to the diet; milk, cream, eggs and lactose are the principal articles constituting the diet. To this are added fine cereal gruels, well-cooked rice, rice custard, tapioca custard, junket, ice cream, wine or fruit jellies, toast, eggs (soft cooked, poached, creamed, or raw, in milk), or fruit beverages, cocoa, buttermilk, koumiss, certain proprietary infant foods such as Mellin's Food, Eskay's Food, Racahout and malted milk, with a well-baked potato, milk, cream or buttered toast added as the condition and appetite warrant.

Milk Diet. — The following milk diets [5] were devised by Dr. Coleman to be given in certain cases of typhoid fever during the

[4] Determined by calorimeter observation from the Russell Sage Institute of Pathology in affiliation with the Medical Division of Bellevue Hospital, under Warren Coleman and Eugene DuBois.

[5] "American Journal of Medical Sciences," January, 1912, by Warren Coleman.

acute stage. These formulas consist of milk, cream and lactose and furnish from 1000 to 3000 calories per day.

	Calories
1000 calories per day —	
Milk, 1000 c.c. (1 qt.)	700
Cream, 50 c.c. (1¾ oz.)	100
Lactose, 50 gm. (1¾ oz.)	200
This furnishes eight feedings, each containing	
Milk, 120 c.c. (4 oz.)	80
Cream, 8 gm. (2 dr.)	15
Lactose, 6 gm. (1½ dr.)	24
2000 calories per day —	
Milk, 1500 c.c. (1½ qt.)	1000
Cream, 240 c.c. (8 oz.)	500
Lactose, 125 gm. (4 oz.)	500
This furnishes seven feedings, each containing	
Milk, 210 c.c. (7 oz.)	140
Cream, 30 c.c. (1 oz.)	60
Lactose, 18 gm. (4½ dr.)	72
3000 calories per day —	
Milk, 1500 c.c. (1½ qt.)	1000
Cream, 480 c.c. (1 pt.)	2000
Lactose, 250 gm. (8 oz.)	1000
This furnishes eight feedings, each containing	
Milk, 180 c.c. (6 oz.)	120
Cream, 60 c.c. (2 oz.)	120
Lactose, 30 gm. (1 oz.)	120

Varying the Diet. — It has been found possible, even advisable, to vary the above diets in many cases. The disease extends over such a long period that if a fluid diet is adhered to the patient would grow exceedingly tired and even disgusted if milk alone was given, hence a mixed fluid diet such as is used in the Presbyterian Hospital, New York City.[6]

[6] F. P. Kinnicut, "Diets Used in the Presbyterian Hospital," New York City.

PRESBYTERIAN HOSPITAL DIET LIST

8 A.M. Milk and coffee, each 120 c.c. (4 oz.).
10 A.M. Milk, hot or cold, 240 c.c. (8 oz.).
12 M. Oatmeal gruel, 120 c.c. (4 oz.), with milk 60 c.c. (2 oz.).
2 P.M. Junket with cane and milk sugar.
4 P.M. Oatmeal gruel, 120 c.c. (4 oz.), with milk 60 c.c. (2 oz.).
6 P.M. Junket with cane and milk sugar.
8 P.M. Hot milk, 240 c.c. (8 oz.).
10 P.M. Whey, 180 c.c. with 1 whole egg and sherry.
12 P.M. Oatmeal gruel, 120 c.c. (4 oz.) with milk.
2 A.M. Junket with 60 c.c. (2 oz.) cane and milk sugar.
4 A.M. Milk, 240 c.c. (8 oz.).
6 A.M. Milk, 240 c.c. (8 oz.).

15 gm. (½ oz.) of lactose added to each of the four milk feedings.

The following foods and diet lists are used with success in various hospitals:

From 1 to 1¼ quarts of milk and 1 pint of cream and lactose, beginning with 1 tablespoonful in each milk feeding and raising the amount day by day until the patient is taking 2 oz. (4 tablespoonfuls) at each milk feeding, given in eight feedings. This may be given as milk, hot or cold, or it may be made into cocoa, soup, ice cream, junket, or on the cereal.

LIQUID DIET

Milk
Cream
Buttermilk
Whey
Koumiss
Zoolak
Fermillac
Albumenized fruit juices, egg, and orange juice
Milk shake
Broths (chicken, beef, mutton, or clam), reënforced with lactose or egg or given plain
Proprietary infant foods
Cream soups, beef juice, liquid peptonoids, panopepton
Orangeade
Lemonade
Eggnog
Milk punch

Malted milk
Malted milk shake
Albumenized milk
Strained gruels (except oats)
Cream, egg and vichy
Chocolate malted milk
Milk gruels

SOFT OR SEMI-SOLID DIETS

Eggs — creamed, soft-cooked, poached, custards, baked custard.
Toast — milk or cream toast.
Gelatine — meat, fruit, or wine jellies.
Junkets — plain, egg, or cocoa.
Cereals — fine, strained cereals, except oats.
Rice — boiled or in custard.
Tapioca — custard.
Baked or mashed potato.
Cornstarch or arrowroot pudding.
Ice cream.

Meat is not given until convalescence is established, and then in only the most digestible form, such as rare beefsteak or lamb chop or a small piece of broiled breast of chicken.

DIET LIST USED IN HIGH CALORIE DIETS FOR TYPHOID FEVER

Time	*Material*		*Amount*	*Calories*
6 A.M.	Hot milk		4 oz.	78
	Cream		2 oz.	76
	Lactose		½ oz. (15 gm.)	60
8 A.M.	Cocoa	Milk	3 oz.	59
		Water	3 oz.	
		Cocoa	2 tsp.	35
		Cream	1 oz.	38
		Sugar	2 tsp.	40
		Lactose	½ oz. (1 tbs.)	60
	Egg		1	60
	Toast		1 slice (well moistened)	73
	Butter		½ oz.	73
10 A.M.	Buttermilk		6 oz.	56

DIET LIST — *Continued*

Time	*Material*		*Amount*	*Calories*
12 M.	Cream of pea soup		6 oz.	300
	Mashed potato		20 gm.	28
	Toast		1 slice	73
	Butter		20 gm.	84
	Coffee and milk		3 oz. each	59
	Cream		2 oz.	76
	Sugar		2 tsp.	40
	Lactose		20 gm.	80
3 P.M.	Orange juice and egg	Orange juice	3 oz.	38
		Egg	1	60
		Lactose	30 gm.	120
5 P.M.	Farina		3 oz.	102
	Milk		2 oz.	59
	Cream		2 oz.	76
	Lactose		20 gm.	80
	Egg		1	60
	Apple sauce		1 oz.	30
	Cream		1 oz.	38
	Cocoa		6 oz.	108
	or			
	Tea and		3 oz.	0
	Milk		3 oz.	78
	Sugar		2 tsp.	40
	Toast		1 slice	73
7 P.M.	Gruel		4 oz.	102
	Cream		2 oz.	76
	Lactose		15 gm. ($\frac{1}{2}$ oz.)	60
9 P.M.	Broth		6 oz.	18
	Egg white		1	13
12 M.	Milk		4 oz.	78
	Cream		2 oz.	76
	Lactose		20 gm.	80
3 A.M.	Milk or		4 oz.	78
	Malted milk		1 tbs.	58
	Cream		2 oz.	76
	Lactose		20 gm.	80
			Total calories	3145

Advantages of Newer Treatment. — A marked difference is noticed in the patients treated by the old starvation diets and those given the high calorie diet. Dr. Coleman states [7] that while the

[7] "Journal of American Medical Association," Aug. 4, 1917.

range of temperature is apparently unaffected, the total duration of the disease is shortened in some instances by months through the shortening of convalescence. He further states that certain symptoms which have hitherto been attributed to the specific action of the typhoid bacillus have been discovered to be due to faulty methods of treatment, particularly to an inadequate or improperly balanced diet. The various investigators who have made the study and treatment of this disease a lifework claim that the mortality from this disease has been tremendously reduced by the use of the high calorie diets which maintain the nutrition of the patient throughout the disease, thus eliminating the horrors of the long, tedious convalescence which tried the nerves and patience of the patient, the nurse, and the physician. There is no doubt that so far as the administering of this diet is concerned it requires more effort on the part of the nurse than the old treatment of a glass of milk every two or three hours. It is necessary for the nurse to be able to carry out the orders as expressed in the diet lists, to be able to compute the proteins (nitrogen), fats, and carbohydrates in a food or recipe. But this is readily done by studying the tables given in the first section of this text. She must likewise be able to recognize the symptoms as they arise. In hospitals, the urinalysis is made as a routine procedure. In private cases the physician will either have the analyses made or expect the nurse to be able to make the simple tests.[8]

One of the greatest difficulties attending the administering of the high calorie diet is persuading the patient to take sufficient food for his needs. The fluids are often more difficult to give in quantity than the more solid foods, and it requires much tact on the part of the nurse to prevent a refusal of the necessary fluids. However, if the patient is possessed of even ordinary intelligence, an explanation of the reasons for the large amount of food will as a rule be all that is necessary. Few individuals will willingly prolong an illness attended with the discomforts generally present in typhoid fever.

Hemorrhage occurs in a certain percentage of cases of typhoid regardless of the diet, whether it be a strictly milk diet or the high

[8] See urinalysis, p. 299.

calorie diet just described. The measures to combat them are essentially the same. It is necessary to guard against excessive tympanites since the pressure therefrom against the ulcerated intestinal walls may cause perforation resulting in hemorrhage. Lactose at times causes an evolution of gas as do fats under certain circumstances. Hence it is necessary to follow symptoms and watch the stools in order to determine which food material is to blame for the tympanites and reduce the allowance of that food in the diet.

Idiosyncrasies against Milk. — Certain individuals manifest an inability to take milk. This may be real or imaginary. When it is a true idiosyncrasy, it may be found necessary to substitute some other food for the milk in the diet, but great care should be taken to determine the real character of the disagreement before eliminating so invaluable a food from the diet. When the disagreement proves merely a distaste for milk, some of the different methods used in disguising it, such as flavoring or coloring, may be practiced. Otherwise, it is well under the circumstances to use some of the pre-digestive methods in order to increase its utilization. It is well to emphasize the value of accurate data on this subject, as it is exceedingly difficult to administer a high calorie diet without milk in some form.

Essential Points. — Thus the dietary in typhoid fever is seen to be the most important part of the treatment. A careful study of the tables will enable the nurse to do her part in nourishing the patient. It is necessary that she be able to compute the nitrogen, carbohydrates, and fats in a diet and arrange these constituents in such a way as to give the desired amount of each in the dietary and in a form acceptable to the patient.

SUMMARY

Rate of Metabolism is greatly increased in typhoid fever even over other febrile conditions, not only on account of the elevation and duration of the fever, but also on account of the activities of the specific bacteria in the intestinal tract which differentiate this disease from other febrile conditions.

Energy Expenditures and Requirements of the body in typhoid fever, on account of the character of the disease, are much greater than those of the normal individual and must be met by an increase in the diet if the body is to be saved from destruction.

The Bowels. — Diarrhea develops during any period of the disease due to excess amount of fat or to a disagreement of some of the other food constituents. It is advisable to cut down the allowance of cream temporarily and to watch stools and other symptoms for evidences of dietetic errors.

Hemorrhage must be guarded against by eliminating, as far as possible, all substances liable to cause an excessive gas formation in the intestines.

Absorption of Food is as a rule good. The patient is usually able to handle a large quantity of food provided it is judiciously administered with a due regard to the symptoms manifested at the time.

Simplicity of Diet is absolutely essential. All the materials must be selected carefully according to the physician's orders and prepared with the greatest care in order to prevent digestive disturbances.

High Calorie Diet is one in which the fuel value of the food ingested meets or exceeds the energy expenditures of the patient. Foods composing the diet are, milk and eggs for the proteins, with carbohydrates and fats in their simplest and most digestible form to balance the diet.

Administering a High Calorie Diet is accomplished successfully provided the nurse exercises care with regard to the symptoms arising from time to time. These must be carefully noted and reported to the physician, for in this way only is it possible to give a sufficient quantity of food to cover the excessive breaking down of the body due to the disease.

Fluid Diet is at times necessary since certain patients cannot tolerate a high calorie diet, but this is a point decided by the physician. A fluid diet consists of fluids alone, milk in particular, with broths and fruit beverages as ordered. The milk is given in definite amounts and at stated intervals.

Milk Diet is one consisting solely of milk or in which the bulk of the nourishment is furnished by milk. It may be reënforced or not as desired. Lactose is the substance commonly used as a reënforcing agent. It is impossible to cover the energy expenditures of typhoid fever with a milk diet even if it is perfectly administered, but certain complications make it, at times, the only rational method of feeding.

The Advantages of High Calorie Diet over other diets are distinctly noticeable in typhoid fever patients. Those treated by this method are more comfortable during the course of the disease and are saved a long, tedious convalescence which has made the starvation treatment a thing of horror in the past. The return to health is attended by a much better physical condition when the patients are well nourished than is possible when they are kept on practically a starvation ration. The mortality from the disease has been materially lessened by the administration of the high calorie diet.

Acidosis may develop in typhoid fever patients and must be guarded against. The behavior of the fat in the body should be carefully watched and the amount reduced at the first evidence of acidosis. At the same time an increase in the carbohydrates may assist in overcoming the condition. This adjusting of the diet, however, is entirely in the hands of the physician.

The Kidneys in typhoid fever patients are under a great strain, chiefly on account of the increased rate of metabolism. Great care must be exercised in the dietetic treatment to prevent these organs from being overworked with a consequent development of nephritic conditions.

Care of the Mouth in any febrile condition is important, but especially so in typhoid fever, where the disease itself causes a most unpleasant taste in the mouth. This prevents the taking of nourishment with any degree of comfort, hence the mouth should be cleansed before and after each feeding. Any of the aseptic mouth washes may be used.

Thirst may be relieved by plain or carbonated waters, fruit beverages, and crushed ice. When in certain complications the

fluids in the diet are in a measure restricted, ice is used and water is given in spoonful doses. This, however, is the exceptional, rather than the ordinary state of affairs.

Increasing the Diet after a fluid diet must be made with great care in order to prevent a relapse. Following the high calorie diet the increase is simple. The patient passes from the prescribed foods to meat with apparently no effort. The increase should not be made, however, until convalescence is firmly established.

Reënforcing the Diet. — On account of the great increase in the rate of metabolism and because of the difficulty of furnishing the requisite number of calories in the diet, reënforcing agents such as lactose, eggs, some forms of casein, or beef preparations are used.

Idiosyncrasies against certain foods are, at times, manifested by patients. Efforts must be made to determine whether they are real or imaginary before eliminating any food which may be of importance to their future welfare.

CHAPTER XVI

FEVERS IN GENERAL

FEVER is an abnormal condition characterized by an elevation of body temperature, quickened respiration and circulation, and a certain amount of tissue waste. This elevation of temperature may be due to various conditions, such as local inflammation, infectious diseases, disturbed metabolism and food poisoning (ptomaine).

Tissue Waste in Fevers. — Fevers of short duration, such as accompany colds, tonsillitis, chicken pox and intermittent fever, remittent fever, and at times malarial fever, do not cause sufficient tissue waste to make the nutrition the important feature of the treatment. In ptomaine poisoning the tissue waste may be great, but it is the result of the poisoning, as is the fever, so that the diet needs to be adjusted only after the disturbance has abated. In the beginning, starvation is instituted and the fever disappears when the poisoning is controlled.

Treatment of Fevers of Short Duration. — In all fevers of short duration then, the treatment is directed with the following points in mind: (1) relieving the cause, (2) preventing gastro-intestinal disturbances, (3) saving the heart, kidneys, etc., extra strain.

Dietetic Treatment. — In doing this the diet is so formulated as to meet the above-mentioned conditions, and fluids seem the best form in which food can be given to bring about the desired results. The quantity of fluids should be small and the intervals between feedings short. Two-hour intervals seem best in the beginning. These intervals are lengthened as the fever decreases and the amount of food at each feeding increased. When convalescence is established, semi-solid, soft or convalescent diet may replace the fluids and the patient gradually brought back to a normal diet.

Fluid Diet. — The following foods constitute a fluid diet: milk, whole milk, plain, peptonized, or albumenized, buttermilk, koumiss, malted milk, milk shake, milk punch, cream, whey; fruit beverages, plain, albumenized, or mixed with whole raw egg; eggnog, milk and ginger ale, cocoa, strained gruels, broths reënforced with egg or plain. Carbonated water may be added to milk or fruit beverages.

Schedule of Feeding. — The following schedule may be used as a guide in fevers of short duration:[1]

I

7 A.M.	6 oz. hot milk or cocoa.
9 A.M.	6 oz. broth reënforced with egg.
11 A.M.	Milk shake.
1 P.M.	Oatmeal gruel, 4 oz.; 2 oz. cream.
3 P.M.	Albumenized orange juice, 4 oz.; 1 egg white.
5 P.M.	6 oz. broth reënforced with egg white.
7 P.M.	6 oz. cocoa.
9 P.M.	6 oz. malted milk.
12 M. and 7 A.M.	4 oz. hot milk and 2 oz. cream.

The above furnishes approximately 750 calories.

II

7 A.M.	6 oz. cocoa.
9 A.M.	4 oz. oatmeal gruel, 2 oz. cream.
11 A.M.	Eggnog.
1 P.M.	Milk broth reënforced with egg. (3 oz. milk, 3 oz. broth, 1 egg white.)
3 P.M.	Cream, egg and vichy.
5 P.M.	Albumenized milk, 6 oz.
7 P.M.	Hot malted milk chocolate, 6 oz.
9 P.M.	Milk broth reënforced with egg.
12 M.	4 oz. oatmeal gruel, 2 oz. cream.
4 A.M.	6 oz. malted milk (half water, half milk).

Furnishing approximately 1500 calories.

[1] In scarlet fever and other conditions in which the kidneys may be involved the above diet is not given unless advised by physician in charge.

III

7 A.M. Oatmeal gruel, 4 oz., 2 oz. cream.
9 A.M. Orange eggnog.
11 A.M. Malted milk chocolate (3 oz. milk, 3 oz. water).
1 P.M. Clam broth (milk), 6 oz.
3 P.M. Milk shake, 4 oz.; 2 oz. cream.
5 P.M. Cornmeal gruel, 4 oz.; 2 oz. cream.
7 P.M. Hot cocoa, 6 oz.
9 P.M. Hot malted milk.
12 M. Hot milk, 4 oz., 2 oz. cream.
4 A.M. Hot milk, 4 oz.; 2 oz. cream.

Furnishing approximately 1460 calories.

The two night feedings may be omitted if patient is asleep.

These diets will be seen to be below the maintenance requirements in health, but the need for care in preventing gastro-intestinal disturbances makes it safer to have it so for a few days, especially if the elevation of temperature is great. After the temperature becomes normal the following foods may be added to the diet:

Soft or Convalescent Diet. — Cream soups, soft-cooked, creamed, or poached egg, soft or baked custard, junkets, egg, cocoa, or plain vanilla ice cream, soft toast, milk or cream, buttered toast, cereals, gelatine jellies, fruit, wine, or meat jellies, vegetable purées, baked white potato, apple sauce, baked apple, fruit whip, blanc-mange, broiled lamb chops, beefsteak, or chicken, sweetbreads, broiled or creamed brains.

Sample Menus. — The following menu is a sample convalescent dietary:

BREAKFAST

7:30 A.M. Cream of wheat 3 oz., cream 1 oz.
1 soft-cooked or poached egg.
1 slice of toast buttered.
6 oz. cocoa or milk flavored with coffee.
2 tablespoonfuls of strained prune pulp with 2 oz. cream.
10:30 A.M. Albumenized orange juice.

DINNER

12 : 30 P.M. Cream of pea soup, 6 oz.
1 baked potato with butter.
1 slice of buttered toast.
1 cup of cocoa or 1 glass of milk or buttermilk.
3 : 30 P.M. Ginger ale and milk, 3 oz. each.

SUPPER

6 P.M. 2 slices of buttered toast moistened with 4 oz. milk and 2 oz. cream.
1 soft-cooked egg or 3 tablespoonfuls of well-cooked cereal or 2 tablespoonfuls of boiled rice.
2 tablespoonfuls of apple sauce served with 1 tablespoonful of cream.
1 cup of cocoa, malted milk, whole milk, or buttermilk.
9 P.M. 4 oz. hot milk, 2 oz. cream, or 1 cup of cocoa or malted milk.

The return to normal diet is made with caution that the digestion of the patient may not be upset or the temperature raised again by overfeeding.

Energy Requirements. — In fevers of short duration it is not difficult to regulate the amount of food necessary for the maintenance of the patient, since the body will, as a rule, adjust itself when the cause of the fever has been removed. At times, however, it is necessary to make an effort to tempt the appetite of the patient when convalescence is established, that recovery may be made more rapid and complete.

Care of the Mouth. — Probably there is nothing more essential in the treatment of fevers in general and typhoid fever in particular than the care of the mouth. Well-nourished patients rarely ever show the dry, cracked tongue and lips that was formerly one of the common occurrences in typhoid fever. However, in any febrile condition the mouth is apt to acquire a disagreeable taste; this

" bad taste " is so prominent in certain cases as to render it difficult for the patient to eat. This can be, to a great extent, eliminated by the use of aseptic mouth washes. When the patient is not strong enough to rinse the mouth before and after eating, the nurse must use a swab for the purpose. The food must be carefully selected and attractively served and every effort made to make food as dainty and palatable as possible.

Thirst. — Thirst is relieved with crushed ice, fruit beverages, and carbonated waters. In certain conditions it is necessary to limit the fluids, but in typhoid fever the giving of the requisite amount of liquids is one of the most difficult tasks confronting the nurse. It is wise to find out the beverages particularly liked by the patient and, whenever it is possible, make use of them. As a rule alcohol is not necessary in the diet of typhoid fever patients. However, in certain cases of that disease, as well as in febrile conditions induced by other causes, the use of alcoholic stimulation may be necessary; it must be left to the discretion of the physician to prescribe it.

SUMMARY

Intestinal Disturbances are accountable for the majority of the fevers of short duration during infancy and childhood, and in many of those cases in adults.

Malaria causes an elevation of temperature which is, as a rule, of short duration.

Contagious Diseases, such as scarlet fever, measles, whooping cough, and mumps, are likewise accompanied by a more or less elevation of temperature.

Treatment consists of a period of rest in bed, with an abstinence from food, in order that the disease may manifest itself, and also that any offending food material which may cause the fever may have an opportunity to pass out of the body.

The Heart, in some of the diseases accompanied by an elevation of temperature, is more or less strained; this is particularly true in tonsillitis, diphtheria, etc.

The Kidneys are likewise taxed in certain diseases, even when the fever is not great or lasting; this is found to be the case in scarlet fever, tonsillitis, etc.

Dietetic Treatment consists in giving no food for a period lasting from twenty-four to forty-eight hours. This is followed by a liquid diet, milk and broth particularly, which is continued as long as the fever remains.

Convalescent Diet is instituted as soon as the fever has disappeared and acute symptoms subside.

Thirst is apt to be great with any elevation of temperature. It is relieved by water, crushed ice, and fruit beverages.

The Mouth requires much care, even in fevers of short duration. A simple antiseptic wash should be used several times each day.

Nitrogen Equilibrium is not sufficiently disturbed in such cases to require taking into account. Should the disease, however, develop into one causing a material breaking down of the body tissues, measures must be instituted to prevent the upsetting of the nitrogen balance in the body.

CHAPTER XVII

DISEASES OF THE RESPIRATORY TRACT

TUBERCULOSIS, PNEUMONIA, AND TONSILLITIS

TUBERCULOSIS

THE dietetic treatment for tuberculosis must, as in any other pathological condition, depend largely upon the general condition of the patient, and the symptoms manifested at the time.

Character of Disease. — The disease may have reached an acute stage in which the rise of temperature is marked and the progress of the tubercular symptoms rapid, or it may be found to be an old chronic condition in which the progress is slow.

Again, the patient may be found to be suffering from a tuberculosis which is neither acute nor very slow. Each of these stages requires slightly different treatment which, however, for the main part is much the same.

Individuals having an incipient form of tuberculosis have been known to develop an acute form of the disease upon being subjected to a strenuous treatment for some other and entirely different condition. This has been especially noticeable in certain individuals to whom the starvation treatment is given.

Dietetic Treatment in Acute Stage. — The dietetic treatment of the acute tuberculosis under such circumstances must necessarily be adapted to that of the original disease for which starvation was believed to be necessary. The forbidden foods must still be omitted from the dietary, but in these cases it is found advisable not to prolong the starvation treatment but to substitute foods which will do the least harm under the circumstances. This is necessary to cover the energy requirements of the body and to make good the tissue wasted through the development of the specific disease.

Dietetic Treatment in Chronic Stage. — The diet for tuberculosis has been so widely discussed and so universally used that a few words only seem necessary here. One of the chief points to be emphasized is the danger arising from gastro-intestinal disturbances. The digestive apparatus of the tubercular individual is more apt to be impaired, so that any undue exertion required to digest a meal is likely to bring about disturbances more or less serious in character.

Method of Administering Diet. — For this reason it is no longer the custom to stuff the patient in an effort to overcome the inevitable tissue waste, since such treatment in many cases defeats the end for which it was intended, bringing on acute indigestion, or at times diarrhea, which might readily cause a greater loss of body weight than could possibly be produced by the surplus food given.

Adjusting the Diet. — More and more is it coming to be understood that the diet must be adjusted to suit the individual. Three wholesome meals a day are insisted upon, with lunches given between the morning and midday meal and during the course of the afternoon. Many patients are found to sleep better after they have partaken of a light lunch, consisting of hot milk, malted milk, or like beverages and crackers, so that this third meal is added to the other five. In this way the individual suffering with tuberculosis is assured of an efficient diet to meet the needs of the body without overburdening the digestive apparatus or overtaxing the excretory organs. The increased metabolism taking place in such patients, due both to the specific bacteria and to the febrile condition, is, as far as possible, provided for.

Schedule of Diets. — The following dietary régime may be useful in formulating menus for tubercular patients:

BREAKFAST

Fruits.
5 oz. cereals with cream.
1 or 2 eggs, simply prepared to prevent indigestion.
2 slices of bacon, ham; fish cake or chop.

2 slices of toast or crusty rolls with butter.
Coffee, tea, or cocoa, with or without cream.[1]

Lunch

Vegetable or cream soups.
Cold meat, lamb chops, oysters, or fish.
Baked white or sweet potato.
1 green vegetable, — greens, cabbage, spinach, or string beans.
Stewed fruit or baked apple.
Rice or tapioca pudding.
Tea.
Bread and butter.

At the end of the meal one glass containing two-thirds milk and one-third cream. If the latter disturbs the digestion reduce the amount temporarily, or add one-half the contents of a tube of peptonizing powder, or one-quarter of a glass of limewater.

Dinner

Meat, lamb, mutton, chicken, duck, game, or fish.
Mashed or creamed potatoes.
1 or 2 green vegetables.
Simple salads.

Simple desserts consisting of puddings, custards, wine or fruit jellies, ices or ice cream, sponge cake or angel food cake.

The milk and cream is taken at the end of the meal as directed above.

Lunches

11 A.M., 4 P.M., 9 P.M., consisting of milk, malted milk, junket, buttermilk, albumenized broth, albumenized fruit juices, cream, egg, and vichy, eggnogs, served with crackers or sponge cake; cereal gruels and raw eggs taken with water, milk, or sherry may likewise form a part of this diet, since the nourishment in them is both concentrated and palatable.

[1] The addition of cream to coffee produces acute indigestion in certain individuals, hence the nurse must be governed by this point in formulating the diet.

Use of Eggs. — The old method of forcing the patient to eat a dozen or more raw eggs a day is no longer used, but three or four a day will be of undoubted value to the patient, provided they agree. There are patients, however, with whom eggs act almost as a poison, and in these cases it is decidedly unwise to force them.

Use of Milk. — Milk is to be used abundantly. If it should disagree, it may be peptonized or modified with limewater. At any rate, every effort should be made to enable the patient to drink at least one quart a day, and more, if possible.

If it fails to agree even when so treated, it should be abandoned, since the discomfort caused under the circumstances is more detrimental to the welfare of the individual than any benefit which he may gain by the small amount which may be absorbed.

High Calorie Diet. — As long as the patient is in bed the diet cannot be as full as it is made when he is up and about, as the body is then using more material to provide for the extra exertion and needs more food to replace that which has been utilized. Consequently the high calorie diet [2] will be found as a rule sufficient. As soon as the patient is able to receive more food without incurring digestional disturbances, it should be supplied, keeping ever in mind the danger of its upsetting his digestion.

Advice to Patients. — The patient must be impressed with the necessity for living a simple, wholesome life, free from excesses of all kinds. The need for a regular régime in the beginning must be strongly emphasized. Too strenuous exercise and the consequent over-fatigue at times completely overcome all the good which has been accomplished in weeks or even months of studied effort, so that rest is an essential part of the tubercular régime. The patient should sleep from eight to ten hours out of every twenty-four, and if this sleep is taken in the open, that is, in a tent or on a sleeping porch, the benefits derived therefrom are inestimable.

The Bowels. — The bowels should move every day, even if some gentle laxative or an enema has to be used to bring about the desired result. In a majority of cases, mineral oil or bran muffins, prunes, raisins, and figs prepared with senna will be entirely suffi-

[2] See "High Calorie Diet for Typhoid Fever," Chapter XV.

cient, however, and these substances are much less harmful than drugs, for the habit of taking purgatives becomes a fixed one in a short time, and is especially liable to become so when the patient is forced, by reason of the sedentary life, to depend on some such measures.

Massage. — Massage has been found beneficial in many cases, giving the needed exercise to the body, which it is otherwise unable to obtain.

CHRONIC TUBERCULOSIS

In chronic tuberculosis, the patient should be instructed in the care necessary for his protection. He should be advised to report to the physician any symptoms occurring during the course of the disease, especially any hemorrhage. He must be reassured of the chances of recovery, even after hemorrhage has occurred. It is not well to encourage the habit of taking the temperature or weighing daily, since the knowledge of the fluctuations which inevitably occur in these conditions may worry the patient to such an extent as to interfere with his final recovery.

Rest, Sleep, and Fresh Air. — Moderation in physical exertion, wholesome food at regular intervals, plenty of rest and sleep, preferably in the open, and an effort made to look forward to a complete recovery will go far toward bringing about the desired result. The tubercular patient who sets his mind on recovery, refusing to be discouraged by the numerous setbacks which may from time to time occur, has a much greater chance of living a long and useful life than the patient who makes no effort in this direction.

Reënforcing the Diet. — The following reënforced foods have been found valuable in the diet for tuberculosis, especially in those cases which are confined to bed and in which the effort to eat causes more or less gastric distress:

Milk, whole milk, milk and cream, milk diluted with Apollinaris water, peptonized, modified milk, reënforced with egg or egg white or reënforced with one to four tablespoonfuls of lactose, malted milk, buttermilk, cream, egg, and vichy, milk shake, milk punch,

malted milk shake, chocolate or cocoa malted milk, albumenized fruit juices, egg and orange, egg and wine, reënforced, if desired, with lactose, albumenized broths, proprietary infant foods, such as Eskay's Food, Nestlé's Food, Mellin's Food, Racahout, cream soups reënforced with lactose or egg, junkets, and ice cream.

Pneumonia

The diet in pneumonia is of considerable importance, since in this condition the strength of the patient is taxed by reason of the character of the disease, and the only means of attaining endurance to carry him through this trying period is by providing proper nourishment.

Dietetic Treatment. — The same general outline of diet is used as in acute infectious fevers, milk forming the basis of the diet. The patient is given an abundance of water and other beverages in addition to the other fluid foods to relieve the thirst which is so often a common symptom in this disease.

It is sometimes found advisable, however, on account of the vomiting which may occur, to give a more concentrated form of nourishment, in which case liquid peptonoids, trophonine, and panopepton furnish a form of nourishment which is both strengthening and stimulating in character, and for these reasons particularly desirable. Freidenwald and Ruhräh advise against the use of starches and sugars in most cases of pneumonia.

Daily Diet Schedule. — The same fluid diets used in acute fevers and administered at two-hour intervals are advisable here. The following régime is used in pneumonia:

6 A.M. 6 oz. malted milk.
8 A.M. 6 oz. cocoa.
10 A.M. 4 oz. oatmeal or cornmeal gruel with 2 oz. cream.
12 M. 6 oz. chicken broth reënforced with 1 egg white.
2 P.M. 6 oz. malted milk chocolate.
4 P.M. 6 oz. albumenized orange juice.
6 P.M. 6 oz. chicken or beef broth, reënforced with egg white.
8 P.M. 6 oz. hot milk.

Night feeding consisting of milk, malted milk, or reënforced broth may be given at 12 and 4 A.M. if patient is awake.

The above diet may be varied by adding some of the beverages mentioned in the diet for tuberculosis or fevers.

Convalescent Diet Schedule. — As the acute symptoms subside and convalescence advances, the following diet may be instituted:

I

Breakfast 3 to 4 oz. cereal gruel with 2 oz. cream.
1 soft-cooked egg.
10:30 A.M. 6 oz. chicken broth, reënforced with egg, or 6 oz. albumenized orange or grape juice.
1 P.M. 6 oz. oyster soup with rolled crackers.
¼ cup wine jelly with 1 tbs. cream.
1 glass (6 oz.) milk — 2 parts milk, 1 part cream.
3 P.M. Milk shake (4 oz. milk, 1 egg white).
Supper 4 oz. farina with 1 oz. cream.
6 oz. cocoa.
9 P.M. 6 oz. malted milk.

Hot milk, broth, or malted milk may be given during the night at 12 or 4 A.M. if patient is awake.

II

Breakfast 4 oz. orange juice on cracked ice.
3 or 4 oz. strained oatmeal with cream or butter.
1 slice soft toast.
6 oz. cocoa.
10 A.M. 1 soft-cooked egg on toast.
6 oz. milk.
Dinner 6 oz. cream of celery soup.
2 oz. rice.
4 oz. custard (soft or baked).
6 oz. milk or cocoa.
3 P.M. 5 oz. cream, egg, and vichy.
Supper 1 soft-cooked egg.
1 small baked potato.
6 oz. cocoa or malted milk.

III

Breakfast Stewed prunes.
3 or 4 oz. cream of wheat with 1 oz. cream.
1 soft-cooked egg.
1 slice of toast with butter.
6 oz. cocoa or milk.

10:30 A.M. Eggnog (1 egg, 4 oz. milk, 2 oz. cream, 1 tbs. whisky or sherry wine).

Dinner Cream of spinach soup.
2 oz. mashed potatoes.
2 oz. green peas.
1 slice toast with butter.
2 oz. rice or tapioca custard.

3 P.M. 6 oz. albumenized fruit juice.

Supper 1 slice toast.
1 poached egg.
6 oz. cocoa or hot milk.
2 or 3 oz. stewed fruit or prune whip.

The diet may be reënforced with lactose and meat added only when convalescence is well established.

Tubercular Nursing. — The nurse must keep in mind that the lungs are in a condition more or less out of commission, and their work of excretion is forced upon the kidneys. For this reason, as well as on account of the increased strain upon the heart, it is necessary to keep the diet light and avoid all foods which may in any way exert an unfavorable influence upon either the kidneys or the heart.

Milk Diet. — A strict milk diet has been found necessary in certain cases of pneumonia, but this is used only while the febrile condition lasts, after which the diet is gradually increased, as in the case of acute nephritis and in diseases of the heart, to meet the needs of the individual.

TONSILLITIS

Dietetic Treatment. — The diet in this condition is much the same as that used in other acute febrile conditions, that is, a fluid diet, the basis of which is, as a rule, milk.

The development of nephritis and certain cardiac symptoms at times follow attacks of tonsillitis, and for this reason the urine must be examined frequently and the diet carefully adjusted to avert, if possible, this danger. When acute nephritis does follow the attack of tonsillitis, the diet must necessarily be adjusted to meet that condition rather than that of the original disease.

Special Diets. — The Mosenthal diet, and at times the Karell Cure, is used with more or less success. This, however, is adjusted by the physician. It remains for the nurse to report any unfavorable symptoms as soon as they occur, and to carry out the line of dietetic treatment deemed advisable by the physician.

SUMMARY

TUBERCULOSIS

Form. — Acute and chronic in character. The chief aim of the treatment in the former is to prevent its development into a chronic form.

Rest. — **Sleep**, preferably in the open air, in a tent or on a sleeping porch.

Proper Surroundings should be striven for. The patient should be kept tranquil in mind and body, free from disturbing worries and assured of the possibility of recovery with proper care.

Diet should be adequate without being too abundant; stuffing the patient is no longer considered necessary, in fact it is believed that forcing the eating of large quantities of eggs, etc., defeats its own ends, upsetting the digestion and causing a disgust for food almost impossible to overcome.

Gastro-intestinal Disturbances are apt to develop as the disease progresses. These are treated as in other conditions so complicated, except that the period of starvation must necessarily be limited on account of the metabolic waste already taking place from the disease itself.

PNEUMONIA

The Lungs, as in pulmonary tuberculosis, are the seat of infection and are temporarily hampered in their work of excretion.

The Kidneys bear the brunt of the extra work caused by the impairment of the lungs, consequently all unnecessary work must be spared these organs if they are to be prevented from being overtaxed.

Nephritis is one of the complications apt to develop when the kidneys are not sufficiently strong to carry on their own work and that generally done by the lungs.

The Heart. — Cardiac symptoms are also likely to develop during attacks of pneumonia and make the disease one to be dreaded and guarded against.

The Diet. — The dietetic treatment in pneumonia is like that used in acute infectious diseases, fevers in general, fluids constituting the form of diet and milk the chief food, as long as there is an elevation of temperature.

TONSILLITIS

The Heart. — As in pneumonia, the development of cardiac symptoms must be guarded against. These symptoms may not develop at once but show later during or after convalescence.

The Kidneys. — Nephritis also develops in some patients and the treatment is directed as far as possible to prevent its developing into a chronic form.

Dietetic Treatment is the same as used in acute infectious conditions, fevers of short duration, taking care to institute the diet for acute nephritis should the patient show evidences of this disease.

CHAPTER XVIII

DIETETIC TREATMENT BEFORE AND AFTER OPERATION

PREOPERATIVE FEEDING

THE dietetic treatment which is essential before and after operations is deserving of attention here, since it constitutes one of the points so frequently overlooked or slighted. As a rule the treatment depends (1) upon the character of the disease for which surgical intervention is necessary, and (2) upon the general health and physical condition of the patient in question.

Preparatory Treatment. — In many cases it is found to be advisable to build up the patient before subjecting her to the shock of an operation, and the more serious the operation the more necessary this " building-up " process.

The character of the disease also has much to do with the preliminary diet. In certain pathological conditions involving the gastro-intestinal tract, for example, the patient comes to the surgeon after medical treatment has failed to give relief and surgical intervention is necessary to save life. The body is found to be in a condition bordering on starvation, anemic and exhausted from insufficient nourishment. The functions of the blood-making organs have become out of gear, as it were, and the blood consequently is deficient in one or more of its essential elements. For such patients it is wise to attempt to reënforce and strengthen their bodies before operation, that they may have more endurance to withstand the shock which is more or less unavoidable.

Adjusting the Diet. — In any case where preliminary diet is prescribed the condition for which the operation is necessary determines the nature of the diet; for example, if the operation is to be upon the kidney, the diet beforehand would naturally be in the nature of a nephritic one to save the diseased organ unnecessary

work. If the stomach or intestinal tract required surgical care, the diet would necessarily be formulated to meet the particular needs of the organ in question, an analysis of the stomach content furnishing the keynote of the diet. In any case the food must be simple in character and well prepared. All food in any way liable to bring about indigestion should be studiously avoided.

Habits. — The habits of the patient must be regulated so that she may not "overdo"; at the same time, gentle exercise may be the very thing needed to give an impetus to the appetite and thus assist in the adding of strength for the approaching ordeal. Many patients respond readily to a change of air and scene and frequent small meals instead of a few large ones, — a lunch in the mid-morning and mid-afternoon hours, consisting of a glass of milk and a cracker or malted milk chocolate or reënforced fruit juices. A cup of warm milk before retiring induces the much-needed sleep, hence is advisable under the circumstances.

The Bowels. — The bowels must be kept open. Coarse bread such as that made from bran or graham flour is advisable. Prunes and figs cooked with senna leaves are likewise simple laxatives which are both palatable and effective. For stubborn cases of constipation it is often found that a teaspoonful of a conserve made with a third of a pound each of raisins, prunes, and figs ground fine, with an ounce of senna leaves added, taken at bedtime and before breakfast, will overcome the condition and make the patient more comfortable and the general health better.

Preliminary Light Diet. — The day before the operation the diet must be light; the intestinal tract must not be filled with a food mass which is difficult to get rid of. On the morning of the operation the patient is given no food if the operation is to be performed at an early hour, otherwise a cup of tea, coffee, weak cocoa, or broth with a cracker is given. Some physicians give a glass of milk at this time, while others do not. It is the physician who must decide the question if there is any doubt about it. The stomach must be empty before administering the anesthetic.

In certain emergency operations when it has been impossible to prepare the patient ahead, the difficulties attending the adminis-

tering of the ether are sometimes greatly increased. The cleansing of the stomach and intestinal tract oftentimes eliminates or materially decreases the nausea and vomiting which so often forms one of the most dreaded sequences of the operation. For this reason many surgeons require the patient to be given lavage before leaving the operating room.

Total Abstinence. — No food is given for twenty-four hours following the operation (1) on account of the nausea and vomiting which so often follows the giving of an anesthetic — ether particularly — and (2) because the entire organism is better for a complete rest.

Routine Treatment. — The routine treatment in uncomplicated cases is rest, then water, very hot or iced, or carbonated, or vichy in spoonful doses, then albumen water, broth, etc., then milk, buttermilk, koumiss, etc., after which the semi-solids, etc., until a normal diet is reached. After a week or more the character of the operation certainly determines the dietetic treatment. To quote Dr. Thomas S. Brown,[1] "To give the same diet after pyloroplasty, gastro-enterostomy, gall-bladder operation, or gastric resection as we would after operations for fracture of the thigh or cancer of the breast shows a basic ignorance of the pathologic physiology of the former group of cases." "We should remember that hyperacidity remains long after the underlying cause has been removed and it is tempting providence, to say the least, to ply these patients with tomato soup, salad dressing, and coarse food in the early stages of their convalescence."

Character of Diet. — It must be kept in mind that the character of the diet is of vital importance, especially in the after-treatment of operations upon the stomach. In gastro-enterostomy, for example, the food mass passes from the stomach directly into the upper part of the small intestine through the new opening. Thus the semi-liquid food highly acid in character comes in direct contact with the delicate intestinal walls which are accustomed, not to the acid, but to a neutral or alkaline medium.

[1] "Some Gastro-intestinal Notes," "The Medical Clinics of North America," Vol. 1, No. 1, pp. 192–193, by Thomas R. Brown, Johns Hopkins Hospital.

Adjusting Diet to Disease. — Thus it is demonstrated that unless care is used in selecting the diet this portion of the intestinal tract will be injured; hence the nurse must understand which foods are liable to stimulate an excess flow of acid in the stomach and avoid them. She must also keep in mind that the foods given must be in a semi-liquid or very finely divided condition, since the mechanical efforts made by the musculature of the gastric organ act as a direct stimulant to the secretory cells of that organ.

Much of the responsibility thus rests upon the nurse whose business it is to administer the diet. The efforts of the best surgeon in the world may be entirely overcome by a careless, thoughtless, or ignorant nurse.

Rectal Feeding. — In some cases it is found necessary to nourish the patient more than is possible by mouth. This is especially so with emaciated and very weak patients and for those who have undergone operations upon the mouth or throat and in some of the above-mentioned stomach cases when the passage of any food over the newly-operated-upon surfaces is inadvisable. In these cases rectal feeding is resorted to and from two to three nutrient enemas [2] alternated with saline enemas are given daily.

Under ordinary conditions when the patient has not been operated upon for gastro-intestinal disorders, gall-bladder or kidney diseases, the dietetic régime is as follows:

Postoperative Feeding. — First day: starvation, a little hot or cold water or carbonated water may be given if there is no nausea or vomiting. If nausea or vomiting persists, a few spoonfuls of champagne or clam broth or juice will often check or relieve it entirely. Fluids alone must be given during the first forty-eight hours after the operation. When stimulation is necessary, albumen water or coffee containing a spoonful of brandy [3] will be found useful. When nausea entirely disappears, well-skimmed broth, milk, clam or oyster broth, buttermilk, koumiss, malted milk, may be given. A gradual return to the normal diet is made, adding soft

[2] See Formulas for Nutrient Enemata, p. 143.
[3] See Albumen Water with Brandy, p. 221.

toast, soft-cooked eggs, junket, ice cream, meat, wine, or fruit jellies before solid food is introduced into the dietary.

After-care in Feeding. — Care must be observed to prevent indigestion after almost any operation, but especially after abdominal operations there is a great tendency to form gas, hence anything which in any way increases the tendency may bring about a condition of extreme discomfort and even acute pain to the patient. For this reason it is unwise to follow too closely the desires of the patient as to the food to be eaten; for example, corned beef and cabbage may be the thing of all others desired by the patient, but it would be the height of folly to risk such a meal until all danger of digestional disturbances were at an end. It is wiser to avoid such disturbances than to trust to relieving them after they occur. The digestion of even a perfectly normal individual is at a disadvantage when that individual is deprived of outdoor exercise. How much more so will it be when the entire organism is so taxed by the ordeal through which it has just passed. Convalescence is never hastened by imprudent eating, and a condition as bad as the original may be brought on by lack of care on the part of the one whose business it is to feed the patient.

CONDITIONS REQUIRING SPECIAL DIETS

Diet After Appendicitis. — After a simple operation for appendicitis the same régime is carried out as in stomach and intestinal operations: fluids on the second day, soft diet on the third, and solid food of the simplest character and prepared in the simplest way may be given on the fifth and sixth days. When, however, the operation has been of a more serious character, for example, when there was pus formation or a gangrenous appendix, the feeding by mouth must not be instituted for five days or more, nutrient enemas being used instead. Patients have been known to die from exhaustion after operations upon the stomach and intestines, not on account of the operation but on account of the lack of reserve power and endurance to carry them through the ordeal without a sustaining diet to overcome it. Under the

circumstances Dr. F. Ehrlich[4] advises the following routine method: "So soon as the nausea from the anesthetic has worn off the patient gets tea, red wine, and gruel; on the day after the operation he is given sweetbreads in bouillon even if it nauseates him; if the nausea is persistent, his stomach is washed. On the second day finely chopped cooked squab, chicken, or veal, is added; on the third day, beef, potato purée and cakes; on the fourth, chopped (raw) ham, soft zwieback, and soft-boiled eggs. On the fifth, white bread and spinach. After the seventh day the meat is not chopped, and the patient returns gradually to normal diet. The bowels are regulated by oil enemas."

Diet After Operation upon Gall Bladder or Liver. — The dietetic treatment in these cases is like that of any other abdominal operation except for the character of the food. Fats are not well handled by the body of such individuals and should be eliminated as far as possible from the diet. Broths must be skimmed carefully to remove fat and milk when given should be skimmed or given in the form of buttermilk or koumiss.

Diet After Operations upon the Kidneys. — The diet administered after operations upon these organs is logically one in which those foods which are entirely dependent upon the kidneys for their elimination are restricted. In a former chapter the fate of the foods in metabolism was explained; the protein foods were seen to be the ones leaving the body chiefly by way of the kidneys and for this reason in the diet after operations upon these organs, as well as in that administered in disturbances affecting their functioning powers, this food constituent, the protein of meat in particular, must necessarily be restricted. The upsetting of the nitrogen equilibrium is for so short a period after kidney operations that this feature need not be considered here. The diet under the circumstances is essentially the same as that given during acute attacks of nephritis.

[4] "Diet in Health and Disease," p. 555, by Freidenwald and Ruhräh.

SUMMARY

Factors Affecting Diet before and after operations must be considered under two heads, namely, the character of the disease for which the operation is considered necessary and the general physical condition of the patient at the time.

Emaciation and Anemia are often encountered in patients having certain gastro-intestinal disturbances for which surgical intervention was found to be necessary. At times a preliminary up-building treatment is required before it is considered wise to submit the patient to the shock of so serious an operation.

Adjusting the Diet according to the character of the disease for which the operation is to be performed is most important. It is not always possible to build up the body beforehand, but in many cases it is necessary to make the effort. At times the reënforcing of the diet and a certain amount of gentle massage will enable the patient to pass through the trying ordeal more comfortably than would otherwise be possible.

Selecting the Diet to conform to the character of the disease is as important a factor in the recovery of the patient as food itself. This selection is left largely to the nurse, consequently it is necessary that she should understand just which foods are indicated or contraindicated under the circumstances, and adjust the diet after the abstinence period accordingly. For example, the diet fulfilling all the needs of a patient who has just undergone an operation for a broken leg might be highly injurious for a patient just operated upon for some disturbance of the liver or kidneys. The diet given after must be essentially like that given just before the operation, in order that the affected organ may have an opportunity to heal and return to its normal functioning power.

Gastro-intestinal Disturbances must be avoided, both before and after the operation. In the preliminary treatment, when every effort is being made to increase the strength and endurance of the patient, such disturbances do away with any gain brought about by judicious dieting. After the operation, attacks of indigestion not only cause pain and discomfort as a result of the gas formation,

but may cause symptoms far-reaching and even dangerous in their effects. The diet, then, must be composed of the simplest food and prepared in the most careful manner, the amount of food given at a time must be small — it is wiser to feed the patient oftener than to run the risk of indigestion by giving more than can be readily handled by the already taxed digestive apparatus.

The Bowels must be kept open in the majority of cases. Peristalsis is stimulated by the giving of water and fruit beverages as soon as it is advisable to give anything by mouth.

Reënforcing the Diet is at times necessary in order that the patient's strength may be kept up. In such cases lactose, eggs and some of the predigested casein or beef preparations are found to be valuable.

Before the Operation the patient must be made ready to take the anesthetic. This is done by preventing an accumulation of food in the intestinal tract. The day before the operation, then, it is necessary to limit the diet materially by giving food in small amounts. The light diets prescribed in acute conditions are as a rule suitable, unless otherwise indicated.

The Day of the Operation a cup of tea, coffee, or broth may usually be given, with a cracker, unless the operation is to be performed early in the morning, in which case the patient is given no food at all. Some physicians allow a glass of milk on the day of the operation, but this is left entirely to the physician in charge.

After Operation a period of total abstinence from both food and water is necessary in order not to increase or induce nausea and vomiting. As soon as these symptoms subside, unless otherwise indicated, a certain amount of hot, cold, or carbonated water may be given. After this, albumen water may form the first nutrient administered. Milk, broth and fruit beverages follow the giving of albumen water, after which the semi-solids, such as soft eggs, gelatine and milk soups, institute the convalescent diet.

The Character of the Diet after the operation depends wholly upon the nature of the disease for which the operation was deemed necessary.

Diet After Gastro-enterostomy must be adjusted in order not to increase the acid content of the gastric organ, otherwise the delicate mucous linings of the intestines would be subjected to direct contact with materials which are irritating in character, owing to the fact that the mass passes through the new opening and has thus been deprived of the neutralizing agents found in the upper part of the intestinal tract. Under the circumstances milk, albumen water and fine cereal gruels are the best foods from which to formulate the diet after the necessary period of abstinence and fluid diet.

After Appendicitis, as a rule, no food is given for five days in cases where there has been a pus formation and the appendix gangrenous. Otherwise the routine treatment diet is given — water, then albumen water, followed by broth, milk and fruit beverages, fine cereal gruels, etc.

After Liver and Gall-bladder Operations the character of the food must be considered. The fats are not well handled in such conditions and must be avoided as far as possible. Broths must be well skimmed and the milk fat free. Buttermilk and koumiss are probably the most suitable forms in which to give milk in these cases.

After Kidney Operations the work of elimination must be limited as far as possible in such cases. While it is impossible to rest the organ entirely, the giving of a proper diet under the circumstances will do much toward relieving the strain placed upon it. The protein foods, with the exception of milk, must be excluded from the diet. The régime practiced in acute nephritis gives the most satisfactory results.

CHAPTER XIX

URINALYSIS

THE importance of the kidney functions has been clearly demonstrated. Urine, which is the fluid secreted by these organs, is one of the most important sources of information, not only as to the manner in which the body utilizes food in health, but as an index to certain pathological conditions, the processes of which are more or less indicated by the products excreted in the urine.

Function of the Kidneys. — The kidneys, as has already been stated, furnish a means by which the greater part of the waste products of the body are eliminated and in addition to this function they adjust the salts in the body. In an early chapter the function of the salts in food was explained. A certain amount of these substances, we know, is absolutely necessary to carry on the work in the body, but harm comes when a surplus is retained in excess of that which can be used in performing the various processes. Consequently the function of the kidneys to adjust the salts balance is by no means their least important one.

Elimination of the Toxins. — The toxic substances manufactured in the body and those resulting from bacterial action upon unabsorbed proteins are likewise eliminated in the urine. Thus it can be readily understood how necessary it is to keep these organs in good repair, that they may continue their work in an efficient manner.

It is necessary from a pathological standpoint for the nurse to understand the making of some of the simpler tests, that she may simplify her own work and that of the physician.

Excretion of Carbon Dioxide and Water. — We have already spoken of the combinations of carbon and hydrogen compounds. These substances being oxidized, the carbon dioxide produced is

eliminated by way of the lungs and the water is excreted partly by way of the lungs and skin, but chiefly by way of the kidneys.

Oxidation and Excretion of Nitrogenous Substances. — When the nitrogenous substances are oxidized, the used-up oxygen products are eliminated by the kidneys in the form of urea and more or less highly oxidized substances, such as ammonia and other salts, purin bases, and creatinine.

Uric Acid, the chief of the oxidation products of nucleoproteins, is produced in the body and from food, and is always in the urine, being one of its normal constituents. It is only when this substance is in excess in the urine that a pathological condition is indicated.

Examination of the Urine, then, is made for several different purposes: (1) to ascertain whether the kidneys are doing their work properly; (2) to find if the kidneys, or any part of the urinary tract, are either temporarily or permanently diseased; (3) to be able to judge from the various substances in the urine whether there is any abnormal process taking place in the body.

Tests. — In the examination of the urine for the above purposes, certain definite tests are made. These tests differentiate between the abnormal and the normal.

(1) Color.
(2) Amount in twenty-four hours.
(3) Odor.
(4) Specific gravity.
(5) Reaction, acid or alkaline.
(6) Albumen, indican, acetone bodies.
(7) Sugar.
(8) Microscopic examination for casts, cells, bacteria, etc.

The Color of normal urine varies, especially with the amount voided.

The variations in color range from the pale straw color of individuals who are voiding large quantities to the deep lemon or amber of those who void much less.

Pathological conditions are indicated to a certain extent by the color of the urine. Fevers heighten the color, small quantities of

blood cause a smoky appearance, while bile changes the color of the urine to a greenish yellow.

Precipitates in the Urine. — When the urine has been allowed to stand for a time there is sometimes a brick-red deposit due to the precipitate of urates. This disappears upon heating and is not an evidence of any diseased condition.

Turbidity of Urine. — The turbidity of fresh urine then is the only kind which need be considered, since standing in the cold often brings about this condition, due to the growth of bacteria and deposits of both phosphates and urates.

Requirements in Testing Urine. — Urine to be tested should be fresh, and when it is not possible to make the examination at once it should be preserved with chloroform, or some other harmless preservative, until ready to use.

Bacteria in Urine. — The changes due to bacterial growth in the urine are manifested not only by the turbid character of the urine but also by the odor of ammonia.

The Amount of Urine. — The amount of urine voided in twenty-four hours varies with the individual in health as well as in disease. Many individuals void a great quantity during the twenty-four hours, chiefly because they drink a great quantity of water and other beverages. The average amount of urine passed in twenty-four hours by an adult, or a child over eight years, is from 1000 to 2000 c.c. It represents from 60 per cent to 70 per cent of the amount of water ingested.

Collecting the Urine for Testing. — In measuring the urine it is necessary to begin collecting it after the bladder has been emptied the first thing in the morning. The patient should void just before the end of the twenty-four-hour period to be sure that the amount formed by the kidneys during this time is accounted for.

Diseases in Which Urine Is Diminished. — In certain diseases the amount of urine passed is diminished. This is found to be true in diarrhea and dysentery, when water is lost in the feces in hemorrhage from any part of the body and from vomiting. It is likewise at times the case after abdominal operations and in ner-

vous conditions, such as hysteria. The urine is diminished when there is an organic obstruction in the urinary tract and certain obstructive diseases of the heart, the lungs and the liver. In these latter cases, there is seen to be a retention or suppression of urine. In both acute and chronic nephritis and in certain fevers, the bladder at times must be emptied by means of a catheter. At other times, the condition is relieved as far as possible by limiting certain articles of food in the diet. At any rate, these points must be kept in mind when examining the urine.

Effect of Food upon the Urine. — The odor of normal urine is changed after eating certain foods, such as onions and asparagus. In disease, the odor of urine has a distinct value as a means of diagnosis; cystitis gives a foul odor, certain bacteria bringing about a decomposition in the urine and giving rise to an odor of putrefaction. In cases where there is a fistula connecting the bladder and rectum, the urine has a fecal odor.

Specific Gravity of Normal Urine. — The density or specific gravity of urine means the weight of any volume of urine as compared with that of equal volume of distilled water. The specific gravity of normal urine varies from 1.012 to 1.024, that is, in a thousand cubic centimeters of urine there are found from 11 to 18 grams of solid material. In health it is necessary to know the amount of urine passed in twenty-four hours, to be able to judge whether the amount of solids is too high or too low.

Specific Gravity of Diabetic Urine. — In conditions like diabetes mellitus, where there is a wastage of sugar taking place in the body, that is, instead of being oxidized to carbon dioxide and water and glucose, the sugar is passing into the urine without completing its oxidation. The specific gravity rises in these cases to 1030 and over, showing distinctly that a greater amount of solid material is in the urine than is present normally. In chronic Bright's disease and diabetes insipidus, the specific gravity is low.

Method of Determining Specific Gravity. — The specific gravity is determined by the use of an instrument known as a urinometer. The urine is poured into a tube and the urinometer is dropped into it. The different figures are marked upon the stem of the

instrument and it is a simple matter to read off the figures of the level to which the stem sinks.

Reaction to Litmus. — In a former chapter it was stated that normal urine was, as a rule, acid, that is, it turns blue litmus red. Certain diseases render the urine alkaline. A like result is brought about upon the ingestion of sodium citrate or bicarbonate of soda. Urine which stands and becomes decomposed is alkaline in reaction, due to the bacterial action, with the production of ammonia.

Albumen in the Urine. — The presence of albumen in the urine is important, since normal urine does not contain this material in quantities sufficient to be recognized by ordinary tests. Hence in disease its presence is an indication of pathological processes taking place either in the kidney or the urinary passages. The chief abnormal condition indicated by the presence of albumen in the urine is nephritis. Traces of albumen may occur in patients with fever or a heart weakness. Blood and pus in the urine likewise indicate albumen. When the nephritic condition is chronic, the kidneys themselves are diseased and the presence of albumen may be in traces only, while during the acute attack large quantities may be passed, but the urine will clear up after a time.

TESTS FOR ALBUMEN

The heat test[1] is the simplest. This consists of first filtering the urine through filter paper, then pouring some of the clear urine into a test tube, holding the test tube in a flame so that only the upper layer boils, then adding a few drops of 2% solution of acetic acid and boiling again. If there is albumen present, a very faint, or a heavy cloudiness (precipitate of coagulated albumen) forms on boiling and persists or becomes heavier on the addition of a few drops of dilute acetic acid (2%) and boiling again. If a precipitate occurs at the first boiling, but clears up again entirely on adding acetic acid, it is not albumen but harmless phosphates or carbonates.

[1] "Chemistry for Nurses," by Reuben Ottenburg.

HELLER'S TEST FOR ALBUMEN

Into a test tube pour a few drops of nitric acid, filter the urine and allow a small quantity of it to trickle from a pipette down the side of a test tube until it comes in contact with the acid. If albumen is present a distinctly formed white ring is seen at the zone of contact.

TEST FOR INDICAN

This material is found in cases of obstinate constipation and in other intestinal disturbances where the passage of the food mass in the small intestines is delayed and the putrefactive bacteria exert their activities upon the unabsorbed protein.

Test. — Mix equal quantities of urine and fresh hydrochloric acid and add drop by drop fresh concentrated solution of chloride of lime (5 to 1000). Indican is indicated by the appearance of a blue color.

SUMMARY

Urinalysis represents one of the most important means for determining the health of an individual, since it is the urine that shows those substances produced in the body as a result of the breaking down of the body tissues and protein foods.

Composition of Normal Urine must be familiar to the nurse in order that she may recognize any change taking place in the urine of her patient which may indicate pathological conditions in the body.

The Specific Gravity of urine is one of the points by means of which the presence of certain substances more or less abnormal in character is determined.

Other Points, such as color, odor, quantity, reaction, and chemical composition, likewise show any deviation from the normal in the individual.

Urine Tests are necessary to determine the composition of the secretion. The character of these tests and the methods used in making them form an essential part in the training of the nurse.

Tests for the presence of albumen, sugar, and possibly indican in the urine, should be made by the nurse. The latter substance represents the extent of putrefaction taking place in the body and for this reason should be included in the urine tests.

Collecting the Urine for testing is important. The amount includes all that has been voided throughout the entire twenty-four hours beginning after the bladder has been emptied on the first morning and ending after the first specimen has been voided on the morning of the second day.

Preserving the Urine for testing is usually necessary, especially during the warm weather. The specimens should be collected in a wide-mouthed sterile glass jar. This should be kept in a cold place. Some harmless preservative such as chloroform should be added to assure its keeping.

CHAPTER XX

ACUTE AND CHRONIC NEPHRITIS

NEPHRITIS is a disease of the kidneys, in which changes occur in the tissues of the organs themselves; these changes may be caused by inflammation of the kidneys and renal passages brought on as results of the retention of certain poisonous substances in the blood, or from the action of specific bacteria. The disease may be acute or chronic in form and develop as a result of prolonged exposure to cold and wet, of tonsillitis, scarlet fever, typhoid fever, and to a less extent of malaria, syphilis, pregnancy, and tuberculosis, as well as from the effects of certain irritating drugs, such as cantharides and turpentine.

Directing the Treatment. — In any case the treatment must be directed toward the relief of the acute symptoms in the beginning and followed up by a general treatment which will tend to strengthen and relieve the overtaxed organs and to increase their power to functionate normally.

Causes and Effects. — In acute nephritis, the chief symptoms are uremia and edema; the urine is materially diminished in quantity and at times suppressed; it is often found to be rich in albumen and containing hyaline and blood casts, red and white blood cells, and various pigments.

In chronic nephritis, which may be the result of an acute attack, or as a sequel of other diseases already mentioned, there is seen to be a progressive loss of flesh and strength, marked anemia, gastro-intestinal disturbances, increased blood tension and edema, the latter especially in the face on arising in the morning. Uremia may develop at any time.

Limiting the Work of the Kidneys. — In both acute and chronic nephritis, great effort must be put forth to relieve the tax upon the kidneys and to stimulate their functioning power.

In other diseases, in which definite organs are involved, the treatment consists chiefly of resting the affected parts (1) by star-

vation, (2) by deflecting the work to other organs when it is possible, chiefly by changing the diet until the disturbance is overcome. This is generally effectual in most cases, as has been specially demonstrated in the treatment of gastro-intestinal diseases.

Problems to Be Considered. — But in nephritis, there are other problems to consider, which make it impossible to institute such a treatment which will effect a perfect rest of the renal organs. The kidneys represent the chief source whereby the waste products of the body are eliminated. This waste consists not only of the end-products of the nitrogenous foods ingested, but also the end products of tissue metabolism, which is the inevitable result of the wear and tear of life. Hence, when the functions of the kidneys are disturbed, these products, often toxic in character, are retained instead of excreted. Thus instead of forming normal constituents of the urine they find their way into the general circulation, exerting a damaging effect upon the tissues, especially of the kidneys with which they are brought into such direct contact.

Substances Difficult of Excretion. — It has been proved that the kidneys in nephritis find it difficult to excrete certain substances, namely, urea, water, salts, and the purin bodies. Many authorities claim that the uremia manifested in acute nephritis is the result of the retention of end-products of the protein metabolism already mentioned and that the edema is due to a like retention of water and salts. The greatly diminished quantity of urine voided during the acute attack would seem to prove this theory. Martin Fisher,[1] however, claims the condition to be due to an acidulation of the tissues with a consequent osmosis of water, and directs his treatment to overcome this condition, not by restricting the quantity of water and salt, as is generally practiced, but by injecting a saline solution into the body in large quantities with the effect of increasing the flow of urine by concentrating the salt content of the blood and therefore its osmotic power. The fluids are withdrawn from the tissues, thus adding fluidity

[1] Fisher's Solution.

Sodium carbonate (pure crystals)	14
Sodium chloride	10
Water	1000

to the blood stream, which in turn flushes the kidneys, ridding them of the poisons which interfere with their normal functioning.

Adjusting the Diet. — The uremia and edema must be relieved. Since it is an undisputed fact, in the majority of cases, that good results from the regulating of the diet so as to minimize as far as possible the work of the kidneys, the various diet cures will be included here.

Milk Cure. — Milk, as a rule, forms a basis of most of the nephritic diets chiefly because of its low salt and protein content and on account of its non-toxic end-products.

The percentage of water in milk is likewise known and for this reason the fluid content of a milk diet can be easily calculated. However, it is also true that the greatest drawback to a diet consisting solely of milk is the large amount of water therein compared with its nutrient value.

Resting the Kidneys. — During the acute stage of nephritis the kidneys are given as much rest as possible by eliminating all food and restricting the amount of water entering the body. The thirst is relieved by small sips of plain or carbonated water or by ice pellets held in the mouth, or, as is sometimes necessary, by injections of water into the rectum.

Adjusting the Fluids. — The amount of fluid, however, must be adjusted to meet the condition of the patient, taking into consideration the amount of urine voided and the uremic symptoms manifested. If the urine is not suppressed the amount of water taken may be slightly in excess of the urine voided, thus promoting diuresis. In many cases an excellent diuretic drink consisting of one pint of water and one teaspoonful of cream of tartar with a half a lemon and perhaps a little sugar, serves the purpose of relieving the thirst, which is at times acute during this period.

The extent of the starvation treatment must depend upon the patient himself. As a rule, however, it is not carried out longer than two days, after which milk may be substituted, allowing from twenty to thirty ounces per day, which is as much fluid as an ordinary nephritic patient can handle.

The regulation nephritic diet, which is bland in character, con-

tains nothing that will tend to increase the irritation and inflammation of the kidneys, and furnishes a certain amount of nourishment when the symptoms of the disease warrant the giving of any food other than milk.

Available Foods. — The following table of foods may be used unless gastro-intestinal disturbance makes it inadvisable. The food materials in this table are poor in salt and protein. Lactose has been advised as a means of increasing the energy contents of the dietary and is less irritating than sucrose (cane sugar) and may be added to cereals, milk, cocoa, fruit, and fruit beverages:

TABLE

Beverages	*Vegetables*
Milk	Potatoes (white, baked, mashed, or creamed with butter)
Cocoa	Sweet potatoes, baked, with butter
Fruit juices	Green vegetables
Cereals	String beans
Farina	Spinach
Cream of wheat	Greens (mustard, turnips, or beet greens)
Wheatena	*Desserts*
Ralston's Health Food	Rice, tapioca and corn starch pudding
Oatmeal (occasionally)	Cornstarch blancmange, with cream
Rice	*Fruits*
Dry toast, milk toast	Oranges, lemons, grapefruit, bananas, prunes, and canned fruits
Cream toast, buttered toast	

The following schedule by Doctors Chase and Rose shows how the nephritic diet may be arranged:

OUTLINE OF DIETS[1]

Morning	*Noon*	*Evening*
Citrus fruit	Cream soup	Rice, steamed, with cream or baked banana, or as pudding
Cereal:	Plain rice, celery	
Farina, oatmeal, or banana	Potato, spinach, asparagus	Cornstarch blancmange and cream
Cream toast	Chief vegetables, white potato, baked or mashed with butter, sweet potato, banana	Banana and milk
Beverage	Lettuce salad, with oil	
	Cocoa	

[1] Table by Arthur F. Chase and Anton R. Rose. "The Journal of The American Medical Association," Vol. LXIX, No. 6, p. 441.

Doctors Chase and Rose advise farina used more frequently than oatmeal, and the plain cream soup, rice or potato, more often than soups made of celery or asparagus (the latter used to break the monotony). They also advise the more frequent use of green string beans and asparagus in preference to other vegetables.

Elimination of Salt. — In many cases of nephritis, especially those belonging to the parenchymatous type, the kidneys manifest a difficulty in eliminating salt, and instead of excreting the normal quantity, find it impossible to eliminate more than two or three grams or less a day. The retained salts pass into the fluids of the tissues, giving rise to or increasing the already existing edema. Tests [3] have been devised to find the extent of the kidney function to excrete salt. The following diets are among those commonly used: [4]

3 litres of milk (this contains 5 gm. sodium chloride and 100 gm. protein)

or

Strauss Diet, consisting of ¾ litre milk, 4 eggs, 150 gm. bread, and enough fruit and fruit juice, tea and sugar to make it palatable. (This diet contains about 3 gm. of salt.)

If the kidneys are able to excrete the amount of salt contained in these diets, salt may be added in quantities of from 5 to 10 grams.

Salt-poor Diets. — When the kidneys are unable to eliminate the normal amount of salt, some of the **salt-poor** diets should be advised. Coleman claims, [5] however, that these diets have not fulfilled the promises held out by them. Coleman groups the salt-poor diets under three headings:

(1) **The strict salt-poor diet**, of which Widal's diet is an example.

(2) **The medium strict salt-poor diet**, allowing from 2.5 to 5 grams of salt a day. Under this heading the milk diet was placed, in which 2 to 3 grams of salt is served a day at table.

(3) **The moderate salt-poor diet**, in which from 5 to 10 grams of salt are allowed each day. In using this diet it is not necessary to prepare a special menu for the patient, but take precautions to

[3] For more extensive lists see Table of "Ash Constituents of Common Food," pp. 16–17.

[4] "Journal of Internal Medicine," Vol. XIV, 1914. [5] *Ibid.*

leave the salt shaker off the tray and exclude bacon, ham, and other salty foods from the dietary.

Limiting the Amount of Food. — It must be kept in mind that the nephritic condition makes it imperative to fall below rather than exceed the food requirements of the individual.

WIDAL'S DIET[6]

Salt-free bread	200 gm.
Meat (beef, chicken, or mutton)	200 gm.
Vegetables (beans or rice) salt free	250 gm.
Butter, salt free	50 gm.
Sugar	40 gm.

Contains 60 grams of protein, 1 to 2 grams of NaCl, and furnishes approximately 1500 calories.

Strouse and Perry arranged a dietary from the above diet as follows:

8 A.M. Bread, 60 grams; lamb chop, 50 grams; butter, 10 grams; rice, 100 grams; sugar, 40 grams.

12 M. Bread, 60 grams; roast beef, 100 grams; butter, 20 grams; beans, 150 grams.

5. P.M. Bread, 80 grams; butter, 20 grams; chicken, 50 grams.

HALPIN'S SALT-FREE NEPHRITIC DIET[6]

Milk, 1500 to 2000 c.c., white salt-free bread, 400 to 500 grams; salt-free butter, 40 grams; eggs, 4 to 6. This diet contains from 5 to 6 grams of salt.

KARELL CURE

Karell has devised the milk cure, which is used possibly more than any other diet. It not only furnishes a dietary régime, which is used in nephritis, but it is likewise advocated in organic diseases of the heart and blood vessels.

Methods of Administering the Karell Cure. — The cure is begun by giving from 3 to 6 ounces of milk three or four times a day. Karell makes a point of using small quantities to begin with and having the milk skimmed. The milk is given at regular intervals,

[6] "Food for the Sick," p. 108, by Strouse and Perry.

is warmed in winter and given at room temperature in the summer. It may be given plain or diluted with limewater. After a week if the stools remain solid, the daily allowance of milk is increased to two quarts. Constipation is an indication of the agreement of this diet and the patient's utilization of the milk. If, however, he manifests gastro-intestinal disturbances, resulting in diarrhea, the amount must be temporarily reduced. Karell advocates boiling the milk and relieving the constipation with enemas or mild laxatives. The addition of small quantities of coffee to the morning portion of milk, or of stewed prunes or a baked apple to the afternoon feeding, also tends to overcome the condition.

Thirst. — The extreme thirst may be relieved by adding plain water, limewater, or seltzer to the feedings.

If during the second or third week of the cure the hunger becomes too great for the patient to endure, a small piece of herring or stale bread may be given.

Once a day a milk soup thickened with a cereal may be given. The above diet is carried out from five to six weeks, after which the patient is gradually returned to a normal diet. Milk, however, should still constitute an important part of the diet. The Karell Cure is modified more or less to meet the condition of the patient, the amount of milk administered in some cases being more and in others considerably less than mentioned in the above régime.

Limiting the Proteins. — The extent of the damage caused by the end-products of protein metabolism cannot be easily estimated, but it is wise not to err on the side of an over-supply, since the retaining of these materials in the body gives rise to a certain type of intoxication (uremic poisoning).

Relative Toxicity of the Animal Proteins. — The difference between the various animal proteins as to their relative toxicity has been the subject of much discussion. As far as their nutrient value is concerned, they are practically the same, that is, the protein of beef and the protein of chicken show very similar analyses. The beef contains, however, more extractives, which we know are high in purins. These substances have proven detrimental to the welfare of a nephritic patient.

Selection and Preparation of Foods. — For this reason the so-called red meat is sometimes boiled instead of roasted, as the latter mode of preparation increases the formation of purins on the brown outer surfaces of the meat. Chicken and fish contain less purin bases and for this reason are often included in the diet when beefsteak and lamb chops are excluded. Meat soups and broths contain little nutrient value, consisting as they do chiefly of water, salt, and extractives, all of which are looked upon with disfavor, and classed with the offending articles of food in the nephritic diet. Cream soups, except bean or pea soup,[7] may be given in moderation. They are non-toxic in character and of high nutrient value, furnishing a valuable addition to the diet when the gastro-intestinal symptoms permit of such addition.

CONVALESCENT NEPHRITIC DIET[8]

Advisable Foods. — The following foods are used in the formation of diet for an advanced convalescent nephritic patient when not otherwise contra-indicated:

Cereals, potatoes, rice, green vegetables and salads, fruits, fresh and stewed, ham, bacon, or beef[9] once or twice a week, chicken, lamb, or mutton[9] several times a week, simple desserts, such as junket, prune or fig whip, orange, lemon, grape, pineapple, or apricot gelatine, bread, rice, or tapioca pudding, plain vanilla ice cream.[10]

Foods to Be Avoided. — The following foods are avoided except the meats, which must be given not more than once to three times a week, as directed by physician:

Meat broths, especially those made from commercial meat extracts, bouillon cubes, etc.

Strong tea or coffee.

Alcoholic beverages, unless especially prescribed by the physician.

[7] Beans and peas belong to the class of foods known as legumes, which are high in protein and must be treated as any other protein food.

[8] Author's list and diet sheets.

[9] Meats of all sorts should be boiled, or only the inside portions allowed.

[10] Some physicians exclude ice cream from the diet, while others permit a small portion, provided it is not so rich as to cause digestional disturbances.

Added Urea and Salt Test, which was first described by Von Monakow and also carried out in the Peter Bent Brigham Hospital. The method used was as follows:

ADDED UREA AND SALT TEST

Patient is given 75 grams of protein, 4 grams of sodium chloride, and 1500 c.c. of water, with a caloric value of from 2000 to 2200 calories. After the output of fluid, salt and nitrogen reaches an equilibrium on this diet on one day 10 grams of additional salt is given and several days later the patient receives 20 grams of urea. This order may be reversed. The daily output of urine, salt, and nitrogen is determined and charted. After the salt and nitrogen is added to the diet in normal individuals, their excretion after forty-eight hours returns to its previous level. In diseased kidney this may not be the case.

Value of Tests. — Thus it is seen that in these tests for kidney functions, an effort is made to determine the extent of damage wrought by the disease upon the renal organs and the manner in which they react under definite circumstances. However, it is not so simple as it would seem to formulate a dietary based on the findings resulting from the renal tests. Notwithstanding this, these tests are coming more and more into use, both in hospitals and private practice, and a nurse must understand just how they are carried out, and must realize that unless her part is performed with absolute accuracy the entire value of the test will be obliterated. Too much stress cannot be laid upon this phase of the test, if it is to be of any value whatsoever in determining the condition of a diseased kidney.

CHRONIC INTERSTITIAL NEPHRITIS

This form of nephritis is more insidious in character, developing more slowly and manifesting different characteristics, than those seen in some of the other types already mentioned. The condition is, as a rule, associated with heart symptoms and high blood pressure. The blood shows an increase in urea and other end-

products of protein metabolism, whereas there is no manifest change in the metabolism of salt or water. The great increase in volume of urine voided would show an inability on the part of the kidneys to eliminate a highly concentrated urine. This hypothesis is further demonstrated in the urine tests.

Urinalysis. — Upon analysis the urine in these cases shows less albumen and fewer casts than found in other types of nephritis. The disease is manifested by slight headache, gastric disturbances, and a frequent desire to urinate.

Dietetic Treatment. — The treatment here depends upon the extent of the impairment of the functions of the kidney. If the damage is not extensive and the diagnosis has been sufficiently early to insure prompt improvement upon treatment, the diet is so directed as to prevent the occurrence of any of the acute symptoms. The patient is warned against over-eating and drinking, over-exercise and nervous excitement. When it is possible, a change to a warm, dry climate is advisable with more rest and sleep and less work and worry. He is advised to eat less at meals and if hungry to eat a light lunch of milk or buttermilk with crackers in the mid-morning. The same dietary precautions must be taken in these disturbances as in other nephritic conditions, keeping always in mind the fact that the kidneys are the chief organs of excretion in the body, and through them must pass the majority of all end-products of nitrogen metabolism.

Limiting the Nitrogen. — The nitrogenous foods cannot be eliminated entirely, especially if, as is often the case, the individual suffers from chronic nephritis and is up and about attending to business; but they can be judiciously regulated in the diet. All such foods as fried foods, rich pastries, rich sauces and gravy, spices of all kinds, tea and coffee, celery and asparagus, must be avoided.

Limiting the Fluids. — Von Noorden limits the amount of fluid to 1½ liters per day. This does not include the water content of the various foodstuffs. He advises a period of observation to determine the amount best suited to the condition of the patient and reducing this amount from 250 to 150 c.c. a day until the

desired quantity is reached. He advises a drinking day once a week, allowing the patient to drink as much water as he likes.

Development of Uremia. — Whenever evidences of uremia appear the treatment must be changed to meet the condition. It is necessarily more strenuous than that used ordinarily in the chronic nephritis. If the uremia becomes positive, then the treatment laid down for acute nephritis already described must be at once instituted. The patient must be put to bed at once and every effort made to assist the body in getting rid of the causes.

In certain cases of nephritis, in which uremic poisoning is due to the retention of the end-products of nitrogen metabolism, or to the toxins formed as a result of the tissue changes due to the disease, the water then instead of being restricted in the dietary is greatly increased to encourage a free diuresis with a consequent washing out of the accumulated poison. Certain authorities recommend a strict milk and water diet, as has already been described in the beginning of the chapter. A light or soft diet is advised until the condition improves, resting the renal organs as far as possible. This diet may consist of fruit juices, strained cereals with cream, cocoa, milk, buttermilk, toast, butter, strained apple sauce, cream soups, except those made with beans or peas. The above diet is gradually increased by adding a mashed or baked potato, well-cooked green vegetables, stewed or raw fruit, rice and tapioca pudding, and chocolate blancmange.

Selection and Preparation of Food. — The preparation of foods for the nephritic differs in certain particulars from that used in other pathological conditions, namely, the restriction of certain food constituents; dishes made with meat and eggs are cut out of the diet, and salt is used as sparingly as possible, when it is used at all. The nurse must weigh or measure out the maximum quantity allowed and divide this in portions for each feeding, measuring carefully any that is not used and charting it. In this way it is possible to increase or decrease the amount according to the symptoms of the individual. The water content of the various foods comprising the diet is, as a rule, not considered, but it is necessary to adhere strictly to the orders of the physician

and to curtail the beverages, water, tea, coffee, etc., until the amount conforms to that laid down in the dietary.

The nitrogenous foods, with the exception of milk, are as a rule eliminated from the nephritic diet. The nurse must study the tables and learn which food materials come under this head. It may seem difficult to prepare diet for the sick without eggs, but it is possible and at times obligatory.

Combating Anemia. — In chronic (ambulatory) nephritis the anemia must be reckoned with. It is not safe to upset the nitrogen equilibrium of the body, but it has been proved that this may be maintained on as little as 30 or 40 grams of protein a day. This will be seen not to be difficult to obtain when milk forms an important part of the diet. The wheat and oat cereals, as well as the bread, contain protein, and a judicious use of these foods will enable the nurse to give her patient the necessary quantity to offset, in a measure, the anemia which is at times most troublesome.

Advice to Patient. — One important point must be observed by the nurse and impressed upon the patient when he leaves her care. This is moderation in the amount of food eaten. The kidneys must never be overtaxed, even with foods which in themselves seem harmless. As danger lies in over-indulgence, this point cannot be too strongly emphasized.

Advice to the Nurse. — The use of the formulas included in this text is left to the discretion of the nurse. In those calling for seasoning, such as pepper, mustard, etc., the condiments must be omitted. A small amount of celery salt may be substituted in certain instances if the dish is unpalatable without something of the kind. In cases where the salt is restricted the dishes are prepared as directed, with the exception of the salt. The recipes calling for eggs and meat are not to be used unless directed by the physician. Cornstarch, sago, and tapioca may be used instead of gelatine. The following menus may be used as guides in selecting foods to prepare for the nephritic patient after the rigid régime is to a certain extent relaxed:

FULL NEPHRITIC DIET (NITROGENOUS FOODS RESTRICTED)

BREAKFAST

Grapefruit, orange, prunes, pears, peaches, or strawberries.

Cereals: cream of wheat, farina, Pettijohn's, Ralston's, hominy, grits, and oatmeal with cream.

Toast, buttered or creamed.

Cocoa, tea, or coffee, as directed by the physician.

DINNER

Milk or cream soup, well-cooked green vegetables with butter or cream sauce.

Potatoes, white or sweet, baked, mashed, or boiled, with butter, bread or rolls.

Stewed tomatoes, rice.

Salads: lettuce, tomato, romaine, chicory, or fruit salad, with a dressing of oil and lemon, or cream and lemon.

Simple desserts: junkets, cornstarch, sago, or tapioca pudding, baked bananas, rice pudding, apple tapioca, and orange tapioca, ice cream.

Beverages: cocoa or tea, as directed by the physician.

SUPPER

Cereals and cream.

Baked or escalloped potatoes.

Baked or stewed apples.

Salads, excepting those made with meat or eggs.

Junket, raw or stewed fruit.

Toast or rolls with butter.

Cocoa.

Meat, fish or poultry once a day.[18]

[18] The outside parts of roast meat must be avoided, even when meat is allowed once a day. Meat is only added after the condition materially improves.

Breakfast

Stewed or fresh fruit.
Cereals with cream.
Toast with butter.
Cocoa, milk, or tea.

Dinner

Cream soups.
Boiled chicken or fish.
Potatoes, white or sweet.
Green vegetables.
Salads, except with meat or eggs.
Simple desserts.
Rolls or bread and butter.
Milk or buttermilk.

Supper

Cereals or rice with cream or butter.
Baked or escalloped potatoes.
Stewed or escalloped carrots.
Salads, except those made with meat or eggs.
Fresh or canned pears, cherries, or pineapple.
Bread pudding, junkets, or cornstarch blancmange.
Bread, rolls, or toast, with butter.
Cocoa, milk, tea, or buttermilk.

TABLE XXI

SALT CONTENT OF FOOD[19]

According to Leva

	Per Cent of Sodium Chloride in Raw Material		*Per Cent of Sodium Chloride in Raw Material*
Meats		*Smoked and Salted Foods*	
Mutton	0.17	Ham (raw)	4.15–5.86
Veal	0.13	Ham (boiled)	1.85–5.35
Calf's brains	0.20	Salmon (smoked)	7.50

[19] Coleman, in Forchheimer's "Therapeusis of Internal Diseases," Vol. I, p. 642.

TABLE XXI — *Continued*

	Per Cent of Sodium Chloride in Raw Material
Meats	
Calf's kidney	0.32
Calf's liver	0.14
Beef (lean)	0.11
Pork (lean)	0.10
Fish	
Trout	0.12
Halibut	0.30
Herring	0.27
Cod	0.16
Carp	0.086
Salmon	0.061
Mackerel	0.28
Haddock	0.39
Poultry	
Duck	0.14
Goose	0.20
Chicken	0.14
Pigeon	0.15
Turkey	0.17
Venison	0.11
Oysters (washed)	0.52
Oysters (with sea water)	1.14
Prepared Foods	
Plasmon	0.21
Roborat	0.0051
Sanatogen	0.42
Somatose	0.66
Bovril's preparations	0.26–14.1
Valentine's meat juice	0.08–1.20
Egg (white and yolk)	0.21
Egg (white alone)	0.21
Egg (yolk alone)	0.039
Caviar	3.00
Milk (whole)	0.16
Cream	0.13
Buttermilk	0.16
Whey	0.11–0.15
Condensed milk	0.40
Butter (unsalted)	0.02–0.21
Butter (salted)	1.00–3.00
Peanut butter	4.10
Oleomargarine	2.15
Palmin	0.0016
Fructin	0.10

	Per Cent of Sodium Chloride in Raw Material
Smoked and Salted Foods	
Bacon (smoked) (German)	1.01
Bacon (smoked) (American)	11.61
Corned beef (German)	2.04
Corned beef (American)	11.52
Cod (salt)*	23.50
Cod (salt, boneless)*	19.00
Herring (smoked)	11.70
Mackerel (salt dressed)	10.40
Salmon (salted, smoked)	10.37
Sardines (French in oil)	1.34
Cod-liver oil	0.17
Gelatine (dry)	0.75
Beef marrow	0.11
Sausages (Frankfurters)	2.20
Sausages (various kinds)	2.90–8.10
Anchovy paste (Cross & Blackwell's)	40.1
Meat Extracts	
Liebig's	2.60
Kemmerich's	1.40
Various bouillon capsules, extracts, etc.	9.40–22.0
Foods Prepared for Table	
Bouillon	0.5–1.0
Thick soups	0.54
Roast beef	0.98
Roast pork	1.54
Chops	0.97
Roast chicken	0.39
Sauces	0.7–1.5
Spinach	0.91
Cauliflower	0.49
Stewed pears	0.019
Macaroni (à la Napolitaine)	1.04
Scrambled eggs (salted)	1.10
Carrots	0.46
Apple sauce	0.41
Tapioca pudding (unsalted)	0.026
Rice, with apples	0.18
Cheese	
Parmesan	1.93
Swiss	2.00
American (pale)	0.82

* Analysis marked thus: * from Atwater & Bryant.

TABLE XXI — *Continued*

	Per Cent of Sodium Chloride in Raw Material
Cheese	
Pineapple cheese	2.13
Edam	3.30
English cream cheese	0.70–1.15
Vegetables	
Potatoes	0.016–0.078
Beets	0.053
Beans	0.09
Peas	0.058
Lentils	0.13–0.19
Lentils (dried)	0.155
Artichokes	0.036
Cauliflower	0.05–0.15
Cucumber (fresh)	0.06–0.08
Horse radish	0.02–0.06
Radish	0.075
Celery, stalks	0.25–0.49
Celery, roots	0.089
Asparagus	0.04–0.06
Spinach	0.084–0.21
Tomatoes	0.094
Cabbage	0.11–0.44
Onions	0.016–0.09
Canned Vegetables	
Green corn *	0.40
Green peas *	0.70
Tomatoes	0.10
Mushrooms	0.04–0.06
Fruits	
Pineapple	0.071
Orange	0.057–0.055
Apricot	0.0047
Lemon	0.0045
Strawberry	0.010–0.020
Chestnuts	0.045–0.010
Cherry	0.013
Coconut juice	0.035
Olives	0.008–0.210
Plums	0.0046
Gooseberry	0.021
Watermelon juice	0.011
Grape	0.024
Almonds, dry	0.010
Walnuts, dry	0.019
Cane sugar	0.110
Lump sugar	0.049
Chocolate (Lindt)	0.073

	Per Cent of Sodium Chloride in Raw Material
Infant Foods	
Nestlé's Food	0.29
Rademan's	0.03
Robinson's patent groats	Trace
Bread, etc.	
Graham bread	0.61
Pumpernickel	0.46
White bread	0.18–0.20
Zwieback	0.38
Macaroni	0.067
Cereals, etc.	
Barley	0.037
Oats	0.046
Rye	0.014
Wheat	0.013
Rice	0.039
Corn (maize)	0.019
Wheat flour	0.002–0.008
Oatmeal (American)	0.29
Oatmeal (German)	0.28
Quaker oats	0.082
Sago	0.19
Spices	
Capers (preserved in salt)	2.10
Capers (preserved in vinegar)	0.20
Pepper, black	0.51
Pepper, white	0.019
Mustard	2.66
Vanilla	0.055
Cinnamon	0.061
Cocoa beans	0.05–0.095
Coffee, roasted	0.045
Tea	0.15
Drinks	
Ground water	0.0012–0.0060
Spring water	0.00055–0.0046
Ale	0.0017
Beer, German	0.016
Beer, English	0.10
Champagne (Moet & Chandon)	0.0045
Apollinaris	0.043
Fachinger	0.039
Giesshuble (Mattoni)	0.0021
Vichy	0.053

* Analysis marked thus: * from Atwater and Bryant.

SUMMARY

The Kidneys find difficulty in eliminating certain substances, namely, the end-products of protein metabolism — urea, water, salts, and purin bodies.

The Urine constitutes the chief point of investigation. Analysis shows the presence of albumen, casts, blood cells, and pigments, with a corresponding deficiency in the normal constituents, water, urea, and salts.

Volume of Urine. — The volume of urine is reduced, and at times suppressed, owing to the difficulty with which the kidneys eliminate water in nephritic conditions.

The Blood shows the presence of the toxic substances on account of the inability of the kidneys to eliminate them properly.

Edema is a common symptom and is probably due to the retention of salts and water by the tissues of the body. It is treated and at times relieved by limiting the intake of fluids and reducing the amount of sodium chloride in the diet.

Uremia is the most dreaded symptom and develops as a result of the retained toxins in the blood. Its development is prevented, if possible, by reducing the amount of fluid and food, even of milk, in the diet.

Uremic Poisoning is an acute intoxication due to the abnormal retention of these poisons and the inability of the kidneys to eliminate them. It is combated by instituting a starvation treatment which is followed by the above-mentioned restricted diet.

Gastro-intestinal Disturbances, especially diarrhea, are apt to develop in chronic nephritis. Care must be taken to keep the meals small in size, simple in proportion, and constituted only from the allowed foods.

Anemia follows the acute attack and is especially noticeable in those cases in which a rigid starvation régime has been found necessary. It may likewise be the result of a long-continued diet in which the proteins have been reduced to the lowest possible

amount. The simple proteins in the diet must, at times, be increased and the patient advised to take plenty of fresh air and sunshine, in order to overcome this progressive anemia.

Restrictions in the diet are essential. These consist of limiting the amount of food and fluids as well as the type of food ingested.

Restricting the Proteins. — Proteins are restricted on account of the difficulty with which the end-products are eliminated by the kidneys, also on account of the toxic character of these substances.

Restricting the Fluids. — It is necessary, on account of their difficulty of elimination and because they impose an excessive tax upon the circulatory organs.

Treatment is largely dietetic in character by reason of the advantages just mentioned.

Starvation Treatment is instituted in order that the work of the kidneys may be lessened. This treatment consists of abstinence from food with a definite reduction in the fluid intake. It is found to be necessary during the acute stage of the disease.

Extreme Thirst, which is apt to be an annoying symptom at this time, is relieved, as far as possible, with small sips of water or ice pellets held in the mouth.

Nephritic Cures are devised, as far as possible, to relieve the acute symptoms and to prevent the disease from developing into a chronic condition. Milk is the basis of most of these cures. It is given in definite amounts at stated intervals; the quantity and frequency with which it is given being adjusted to the state of the disease and the condition of the patient.

The Karell Cure is one of the best known diet cures used in the relief of acute nephritis. It consists of the giving of skimmed milk three or four times a day in doses ranging from three to six ounces for one week, at the end of which time, provided the stools remain solid, an increase to two quarts a day is made.

Constipation under the circumstances is a favorable symptom, indicating as it does the agreement of the milk.

Diarrhea as a result of gastro-intestinal disturbances has directly the opposite indication. In these cases the milk must be reduced. Karell advises the boiling of milk and relieving the constipation by means of mild laxatives or enemas.

Duration of the Karell Cure is from four to six weeks, after which a gradual return to a normal diet is made.

Hunger is apt to be prominent at this stage of the treatment and is relieved during the second or third week by giving a small piece of dry bread and milk, soup thickened with a cereal, once a day.

Functional Kidney Tests are made to determine the character and extent of the impairment of the functions of the kidneys. The diets used in these tests contain definite amounts of certain diuretic substances, and the analysis of the urine voided during the twenty-four hour period required by the test shows the nature of the impairment and furnishes, in a measure, a means of determining the amount of food and fluid which is safe for the patient to take. It likewise shows the extent to which the restrictions in the salt and proteins are necessary.

Salt-free, or Salt-poor Diets are necessary in some cases. While restriction in the amount of salt used in the preparation of food for the nephritic patient is always advisable, if there is a tendency to edema, the salt-shaker should be left off the tray, and when there is a definite amount of salt prescribed, it should be weighed or measured for the day rather than for the meal, and the amount consumed recorded after each feeding.

Special Points for the nurse to remember are the necessity for an early recognition of unfavorable symptoms — of instructing the patient upon leaving her care in the need for keeping the size of the meals small; — of the danger of indulging in alcoholic or other stimulating beverages; — of eating highly spiced foods, or of eating anything which may cause gastro-intestinal disorders.

She should emphasize the need for regular examination of the urine and the value of rest and freedom from nervous excitement, and the need of living in the sunshine as much as possible.

The nurse should study the diet list and become familiar with the foods allowed and those to be avoided. The tables show the foods which are rich in salts and proteins. She should likewise understand and be able to make the simple test for albumen in the urine and the method of collecting the urine for the test made in the laboratory.

CHAPTER XXI

DISEASES OF THE HEART

THE dietetic treatment in diseases of the heart has been the subject of much study, especially during the past few years.

The Diet. — In this pathological condition, as in many other diseases in which one or more of the functions of the body have become impaired, there can be no hard and fast rule covering the treatment or diet for all cases, but, as in nephritis, the condition of the individual, his symptoms, and the progress and extent of the disease must be taken into consideration in order to formulate a diet calculated to adequately nourish the body, while at the same time imposing the smallest amount of work with the least expenditure of labor upon the part of the diseased organ.

Division of Treatment. — The treatment of the disease then may be said to be divided into three stages: first, the stage of compensation; second, that of moderate compensation; third, that of decompensation. The diet is directed, first, toward relieving as far as possible the strain which is imposed more or less by all the food eaten; and second, at keeping up the general nutrition of the body.

Dietetic Treatment. — No matter what has caused the impairment of the heart functions, the treatment must necessarily remain the same as far as diet is concerned. The patient is no longer able to handle a full and unrestricted diet. As long as compensation is good, the restrictions are scarcely noticeable; alcoholic beverages and possibly tobacco may have to be, to a certain extent, curtailed, and in some cases avoided altogether. However, if the individual desires to live and be comfortable while so doing, he must lead a wholesome, simple life, since he cannot with safety indulge in any excesses, either in diet or in any other particular.

Diet in Second Stage. — When the second stage sets in, that is, when the heart muscle is unable to perform its normal function, attention must be directed toward two main points; first, the work of the heart; second, the pressure upon that organ from other sources, namely, the stomach and intestines. As long as the food does not disagree, that is, so long as there is no fermentation or putrefaction of the food material in the stomach and intestines the flatulence arising from the evolution of gas in those organs is slight and the pressure upward upon the heart inconsiderable.

Restricting the Fluids. — The heart must be spared all unnecessary work. This can only be accomplished by limiting the amount of food and fluids ingested. The latter imposes an extra burden upon the impaired organ to eliminate. Consequently, the amount of fluid should be limited to 1500 c.c. a day at most, and in many cases considerably less than that quantity.

Regulating the Meals. — The meals should be small and the intervals of feeding regular. It has been found best to give the fluids between meals rather than with the food. In many cases of heart disease, as in certain nephritic conditions, edema is a prominent symptom, so that it is necessary to direct our efforts toward overcoming that particular condition. The Karell Cure[1] and the salt-poor diet are used with excellent results. The latter is not so low as the former, and in many cases will accomplish all that is required. A modified Karell diet is used in the Michael Reese Hospital[2] in Chicago as follows:

"MODIFIED KARELL TREATMENT"

(Salt free)

"Milk 200 c.c. at 8 A.M., 12 M., 4 P.M., and 8 P.M., for five to seven days.

Eighth day — Milk same as above.

10 A.M. one soft egg; 6 P.M. 2 slices of dry toast.

[1] See Karell Cure, p. 310.

[2] "Food for the Sick," p. 150, by Strouse and Perry.

Ninth day — Milk as above.

10 A.M. one soft egg and 2 slices of toast.

Tenth to twelfth day — Milk as above.

12 M. chopped meat, rice boiled in milk, easily digested vegetables.

6 P.M. one soft-boiled egg.

The diet is gradually increased until a full tray is reached. All meats and vegetables should be chopped or scraped at first, and the heavier foods should be given only when the heart is practically compensated."

Rules and Regulations. — There are a few general rules which it has been found advisable to impress upon individuals suffering from a disease in which the muscles of the heart have become weakened. The compensation of the organ may improve, but there is still a danger of a re-occurrence or a further development more or less serious, and at times fatal. So for this reason, certain rules must be observed throughout life:

First: the necessity for keeping the meals small, simple, and digestible. Death at times occurs with symptoms of gastric disturbance, which is, after all, due to the heart. Consequently it is not wise to invite such disaster by overeating, or by the partaking of any food which is liable to bring about indigestion, either in the stomach or in the intestines. Most authorities advise four or five meals a day rather than the regulation three, and limit the fluids at meal time to a few ounces only, when any are allowed, and to a maximum amount of 1500 c.c. during the day, chiefly between meals.

Second: the need for limiting the amount and type of exercise taken, especially after eating, since the work of digestion requires all the power and strain of which the heart is capable, and since an additional tax placed upon it by muscular exertion might readily be just the final straw, the added fraction which weighs down the balance on the scale of life.

Third: the advisability of abstaining from alcoholic beverages, unless specially prescribed by the physician in charge.

Certain elderly people suffer from a condition known as senile

heart, which is more or less associated with arteriosclerosis and high blood pressure. These individuals should be prevailed upon to take the precaution of regulating their habits of life, avoiding excesses of all kinds, not only on account of the weakened condition of the heart, but also on account of the condition of the arteries. They should avoid excitement and worry, since the very fact that they are worrying increases the blood pressure. Simple foods in limited quantities, five meals a day instead of three, and an avoidance of too much fluid, should be the keynote of their daily régime.

Tact on the part of the nurse is necessary in all cases, both young and old. It is often more difficult to instill good dietary habits in heart patients, after acute symptoms have subsided, than to carry them out during the acute attack, when the life itself depends upon a rigid adherence to the diet prescribed. But as these rules and regulations are essential to the future welfare of the patient, he must be taught with care, and in such a way that he will not be alarmed to an extent when more harm than good will come of the teaching.

The diet should consist chiefly of milk, eggs, rare meat in moderation (mutton, chicken, fish, and oysters), well-baked bread, well-cooked cereals, potatoes and green vegetables, and simple desserts. All foods which in any way cause gastric or intestinal disturbances must be avoided. If these disturbances arise during the course of the disease, the patient should be promptly returned to the strict milk diet. When edema is prominent, it is treated as already described in the treatment for the like condition in nephritis by the Karell or salt-free diet.

The dietetic treatment given here is merely a guide to be used under certain conditions. The physician formulates the diet, and the nurse must understand what to expect and how to apply the treatment as the symptoms arise.

SUMMARY

Dietetic Treatment, adjusted to relieve the weakened heart muscles and to save the organ from all possible strain.

Three Stages, during which the treatment changes according to the extent and progress made by the disease.

First Stage: The diet is practically normal. Compensation is good, consequently no dietary measures save the limiting of alcoholic beverages are necessary.

Second Stage: The compensation is only moderate and the heart cannot perform its normal functions, hence the diet must be directed toward relieving any pressure upon the organs from other organs and toward lessening the work of the heart itself.

Third Stage: In which the compensation is decidedly impaired and for this reason the dietetic treatment undergoes a decided change.

Digestional Disturbances in which there is an evolution of gas in the stomach or intestines may cause a pressure against the heart which is distinctly bad for it.

Limiting the Fluids in the diet in heart disease is necessary when the compensation is only moderate, as they impose an extra burden upon the organ to eliminate them.

Amount of Food must also be limited. The meals must be small and taken without fluid. The latter should be taken between meals.

Edema occurs in a number of cases and must be treated as in nephritic conditions by limiting the fluids and by confining the diet to "salt-poor" foods.[3]

Karell Cure or modification thereof has been used with good results in many cases of heart disease.

Exercise must be limited in amount and confined to types which will not impose a tax upon the weakened heart muscles. Exercise after eating is especially to be discouraged, as this, together with the efforts required for the digestion of food, might readily prove too much for the heart to accomplish.

[3] See Salt-poor Diets, pp. 308–310.

Elderly Patients must be warned against exercises of all kinds, not only on account of the condition of the heart, but also on account of the condition of the arterial walls. These harden with age and break down under undue pressure.

The Nurse should instruct the patient on the points necessary for the saving of the heart. She should teach the necessity for keeping the meals small and having them more frequently if necessary; of limiting the fluids at meals to a few ounces or leaving them out altogether at this time. She should know how necessary is the reduction of the fluid. She should also warn against the taking of alcoholic beverages except with the permission and advice of a physician.

Excitement and Worry increases the blood pressure, hence must be avoided by individuals suffering with any form of heart disease.

CHAPTER XXII

DIABETES MELLITUS

Definition. — Diabetes is a disease which is characterized by an inability on the part of the body to utilize the carbohydrates, in consequence of which there is abnormal excretion of glucose in the urine.

Sugar in the Urine. — The appearance of sugar in the urine may not necessarily signify diabetes, it may be merely a temporary glycosuria due to certain pathological conditions, such as infectious diseases, diseases or trauma which affect the pancreas, and which disappear upon the recovery from the disease. But any appearance of sugar in the urine should be looked upon with suspicion, since the future welfare of the patient depends largely upon an early diagnosis in any form of diabetes.

True Diabetes. — Allen claims that true diabetes may always be distinguished from nervous glycosuria by the application of the laws governing these conditions (Allen's Paradoxical Law [1]), which is " whereas in normal individuals the more sugar given the more is utilized, the reverse is true in diabetes."

Manufacture of Sugar from Other Foods. — If the carbohydrate foods alone caused all the trouble in diabetes, the disease might be more easily controlled. This, we found, however, not to be true, since in certain conditions the body utilizes the protein foods for the manufacture of glucose also. Consequently in diabetes if the absolute sugar output of the body is to be controlled, the intake of nitrogenous foods must be likewise adjusted.

Functions of Carbohydrates. — In the chapter describing the functions of the carbohydrates in the human body it was demonstrated that their energy-producing properties did not cover the

[1] Allen's Paradoxical Law, quoted from " Treatment of Diabetes Mellitus," p. 18, by Joslin.

extent of their usefulness. It has been proved that this food constituent normally acts as neutralizing agent for the toxic acids produced within the organism as a result of the breaking down of the *fats*. Hence, when this function of the carbohydrates becomes impaired, these acids, Oxybutyric acid, Diacetic acid and Acetone, fail to be neutralized and are consequently absorbed into the blood stream, giving rise to a form of intoxication known as acidosis. When acidosis becomes extreme, the diabetic patient is apt at any time to succumb to the dreaded diabetic coma.

Keeping Urine Sugar Free. — Thus it is seen that the treatment of diabetes mellitus consists not alone of freeing the urine from sugar and keeping it free, but of controlling the acidosis, which may at any time develop.

Diabetic Cures. — Numberless so-called diabetic cures have been brought forward and more or less tested for years, but whether they have really accomplished cures has not been satisfactorily proved. Not until Dr. Allen instituted what is known as the Allen's Starvation Treatment has the disease been so universally treated, at least by one method or modification of one method. Dr. Joslin, who has used this treatment most successfully, does not claim to have accomplished a cure, but states that he is watching the results of the treatment in his patients with interest.

Starvation Treatment. — The Allen Starvation Treatment consists of first a period of about forty-eight hours in which the patient is given an ordinary diet, during which time the daily weight is taken and the urine examined and recorded.

Acidosis. — It has been found in some cases, such as with elderly patients or those in whom there is an evident acidosis, advisable to precede the period of starvation by a preliminary treatment.

Method of Treatment. — Joslin[1] suggests the following method of procedure:

"Without otherwise changing the diet omit fat. After two days, omit protein, then halve the carbohydrates daily until the patient is taking only ten grams, then fast."

[1] "Treatment of Diabetes Mellitus," p. 305, Joslin.

In the Michael Reese Hospital, the following series of test diets are given to determine the severity of the diabetes:

DIABETIC TEST DIETS[3]

BREAKFAST

Grapefruit	½	Butter	10 grams
Eggs	2	Cream	15 c.c.
Bacon	20 grams	Coffee	1 cup
Bread	25 grams		

DINNER

Cream soup	3 oz.	Bread	25 grams
Roast beef	75 grams	Butter	20 grams
Spinach	100 grams	Wine gelatine	4 oz.
Kohl-rabi	100 grams	Coffee	
Lettuce salad	50 grams	Cream	15 c.c.
Ripe olives	15 grams		

SUPPER

Lamb chop	1	Coffee	
Asparagus tips	50 grams	Cream	15 c.c.
Eggplant	50 grams	Butter	20 grams
Tomato salad	50 grams	Bread	25 grams
Custard (diabetic)			

Diet in Mild Cases. — This diet contains approximately 70 grams of protein, 100 grams of fat, and 70 grams of carbohydrates, and the patient is kept on it for at least two days; then the carbohydrates are cut down by taking away 25 grams of bread every day.

If the case is a mild one, this may be sufficient to free the urine from sugar, but the diet is given primarily to enable the physician to find out by means of urinalysis just how great is the functional impairment.

In some cases, which are mild in character, the urine is made free of both sugar and acetone without further dietetic measures. However, when a severe diabetes is manifested and a high percentage of glucose and in some cases acetone bodies are found in the urine a more rigid treatment will be found necessary.

[3] "Food for the Sick," by Strouse & Perry.

Preliminary Diet. — Many physicians find it advisable, as has already been stated, to cut down the food allowance before stopping it entirely. In the Michael Reese Hospital this is done by first giving a practically fat-free diet, followed by one or two days in which three or four eggs, 250 to 300 grams (8 or 10 ounces) of 5% vegetables are given, after which it is found safe to institute the starvation treatment.

Sample Menus. — The following menus are given to illustrate the dietetic treatment which it is deemed advisable to institute in cases where the starvation treatment cannot be given at once:

After the test diet of forty-eight hours, the following régime is instituted:

THIRD DAY

		Protein Gm.	*Fat Gm.*	*Carbohydrate Gm.*	*Calories*
Breakfast:					
½ grapefruit . . .				5	20
1 egg		5.3	4.1		59
1 slice bread . . .		2.6	.3	15	73
Tea or coffee . . .	30 gm.				
Total for meal . .		7.9	4.4	20	152
Dinner:					
Broth	180 c.c.	3.7.	.17	.34	18
Chicken (breast) .	90 gm.	18.2	2.1		92
Spinach	100 gm.	2.0		3.0	20
Potato (1 medium).	90 gm.	1.8	.09	15.6	70
Lemon jelly . . .	90 gm.	4.2		2.7	27
Total for meal . .		29.9	2.3	21.6	227
Supper:					
Lamb chop . . .	50 gm.	9.3	14.1		126
Asparagus . . .	100 gm.	1.5		3	18
Bread	20 gm.	1.6	.2	10	48
Tea or coffee					
Total for meal . .		12.4	14.3	13	192
Total for day . .		40.2	21	54.6	571

FOURTH DAY

		Protein Gm.	*Fat Gm.*	*Carbohydrate Gm.*	*Calories*
Breakfast:					
½ grapefruit				5	20
1 egg		5.3	4.1		59
1 slice bread	20 gm.	1.6	.2	10	48
Coffee or tea					
Total for meal		6.9	4.3	15	107
Dinner:					
Tomato bouillon	180 gm.	2.2	.23	2.5	15
Whitefish	90 gm.	2		5	28
Boiled onions	100 gm.	1.5	.3	7.5	40
Bran muffin (1)		5	7	4.5	101
Tea or coffee					
Total for meal		25.7	16.2	20.5	322
Supper:					
1 egg		5.2	4.1		59
Tomato (baked)	100 gm.	.6		2	10
Bran muffin (1)		1	5	7	101
Tea or coffee					
Total for meal		6.8	9.1	9	170
Total for day		38.4	29.6	44	513

FIFTH DAY

Breakfast:					
½ grapefruit				5	20
Broiled tomato	100 gm.	1.5		3	18
Tea or coffee					
Total for meal		1.5		8	38
Dinner:					
Broth	120 c.c.	3			12
Lettuce	50 gm.	.5		1.5	8
Cauliflower	90 gm.	1.5	.4	3.9	25
Tea or coffee					
Total for meal		5	.4	5.4	45
Supper:					
1 egg		5.35	4.16		59
String beans	100 gm.	2		5	28
Celery	50 gm.	.5		1.5	8
Tea or coffee					
Total for meal		7.85	4.16	6.5	85
Total for day		14.3	12.5	19.9	168

SIXTH DAY

		Protein Gm.	*Fat Gm.*	*Carbohydrate Gm.*	*Calories*
Breakfast:					
Asparagus tips . .	60 gm.	1.5		3	18
Spinach	60 gm.	1.1	1.8	1.8	32
Tea or coffee					
Total for meal . .		2.68	1.8	5.8	50
Dinner:					
Stewed celery . .	100 gm.	1	.10	2.1	15
String beans . . .	50 gm.	1.5		2.5	16
Tea or coffee					
Total for meal . .		2.5	.1	5.6	31
Supper:					
Beet tops	75 gm.	1.5		2.5	16
Onions (boiled) . .	75 gm.	1.5	.3	7.5	44
Tea or coffee					
Total for meal . .		3	.3	10	60
Total for day . .		11.2	2.2	21.4	141

FAST

Method of Administering Treatment. — In many cases the patient is first put to bed during the starvation treatment, but recently Dr. Allen has emphasized the value of exercise, claiming that it assists in utilizing the sugar. In any case, the starvation régime remains the same. The patient is given only coffee or clear broth with or without whisky (one ounce every two hours) and the treatment continued from one to four days, or until the urine becomes sugar free.[4]

It has rarely been found necessary to continue the fast longer than four days, since in most cases the sugar decreases rapidly upon the discontinuance of food.

Loss of Weight. — The slight loss of weight, which may be noticeable as the result of starvation, is not undesirable, especially

[4] The giving of coffee or clear broth, with or without whisky, does not materially affect the starvation and serves to make the patient more comfortable during this trying period.

in those cases where obesity is a prominent feature. In fact care must be exercised in the follow-up treatment to prevent the taking on of weight by the diabetic individual, since, according to Allen, it is often found that even moderately obese patients (180 lb.) continue to excrete a small amount of sugar so long as they hold this weight, even upon a low carbohydrate diet, whereas those same patients show no difficulty in becoming sugar free if the weight is reduced by ten or fifteen pounds.

SCHEDULE FOR TREATMENT AND METHODS OF DETERMINING FOOD TOLERANCES

A number of schedules have been devised to enable the nurse successfully to carry out the Allen Treatment. In following out this treatment and reëducating the organs afterward to tolerate foods which they have been unable to handle on account of the impairment of the sugar-making organs, it is necessary to make a series of tests whereby the diet is gradually increased in its various constituents until the diabetic patient is able to handle a reasonable amount of carbohydrates as well as other foods which have given more or less trouble in the past.

The following schedule, after Joslin,[5] is included, and a careful study of it is advised in order that the nurse may intelligently carry out the Allen Treatment.

Schedule. — Fasting in many cases begins at once and the patient experiences no ill effects from it. However, in severe, long-standing cases many patients do better if the fats are omitted at once and the rest of the diet left unchanged for two days. Then the proteins in the diet are omitted and the carbohydrates cut in half. This halving of the carbohydrates is continued daily until only 10 grams remain, after which they too are omitted. The fast is thus made complete and remains so until the urine is entirely free from sugar.

Carbohydrate Tolerance is determined by giving, as soon as the urine has been sugar-free for twenty-four hours, 150 grams

[1] Dr. Joslin has given a very complete schedule in his "Treatment of Diabetes Mellitus," from which the above schedule is taken.

of 5% vegetables. This is equivalent to from 8 to 10 grams of carbohydrates. After this 5 grams of carbohydrates, or 75 grams of 5% vegetables, are added daily to the diet until the patient is taking 20 grams. Then the addition of 5 grams of carbohydrates is made every other day, using the fruits and vegetables belonging to the 10% and 15% carbohydrate group, until potatoes and oatmeal and finally bread can be tolerated unless sugar appears in the urine before this or the tolerance reaches 3 grams to each kilogram of body weight or, in other words, until a man weighing 150 pounds is consuming 225 grams of carbohydrates per day.

Protein Tolerance. — In making the test for the protein tolerance it is necessary to wait until the urine has been sugar free for forty-eight hours; 20 grams of protein is then given. This is equivalent to 3 eggs, and daily additions of 5 grams protein are made, usually in the form of meat, until the patient is receiving 1 gram of protein to every kilogram of his body weight per day unless his carbohydrate tolerance is zero, in which case it is wise to add only three-fourths of a gram of protein per day.

Fat Tolerance. — A determination of the fat tolerance is made coincidently with that of the protein. No additional fat is allowed until the protein tolerance reaches 1 gram per kilogram of body weight, unless the patient's tolerance for protein is less than that. After which 25 grams of fat per day are added until there is no further loss of weight, taking care never to allow more than 40 calories per kilogram of body weight.

Reappearance of Sugar. — Should the urine again show the presence of sugar, another period of fasting lasting for twenty-four hours, or until the urine is again sugar free, must be instituted. After the second fast the increase in the diet may be twice as rapid as used after the first fast. However, it is not advisable to increase the amount of carbohydrates to more than half of that determined by the former tolerance for a period of two weeks, during which time the urine has been entirely sugar free, then the increase is made more slowly and the amount given should not exceed 5 grams a week.

Weekly Fast Days. — One day in seven should be set aside by

ling's copper solution must be kept in separate bottles until ready for use. Then about 2 c.c. of Fehling's alkaline solution is poured into a test tube and 2 c.c. of Fehling's copper solution is added. This is diluted with hydrant water to 8 c.c. Half of this quantity is sufficient for the test. The upper half of the solution is boiled over flame (gently agitated while heating), and while still boiling a few drops of urine are added. If no change appears, it is boiled again and a few drops more of urine are added. If a reddish precipitate appears, sugar is present. The chemical reaction taking place is the reduction of copper sulphate to cuprous oxide. Sometimes a partial reduction occurs when urates are in excess, but once having seen the real reduction, a partial one cannot mislead the examiner.

Haines's Test. — Pour 1 teaspoonful of Haines's solution into a test tube and boil gently over a Bunsen burner; add 6 or 8 drops of urine and again heat to boiling. A yellow or red precipitate will indicate the presence of glucose.

QUANTITATIVE TEST FOR SUGAR

Benedict's Test.[17] — The simple quantitative test for sugar is the one devised by Benedict. This is simpler than the polariscopic examination and better suited for ordinary use.

Place 5 c.c. of Benedict's quantitative solution in a small dish, add a little less than one-fourth of a teaspoonful of sodium carbonate and one-eighth of a teaspoonful of talcum and add 10 c.c. of water. Dilute urine (1 part urine to 9 parts water) except where the qualitative test showed a low percentage of sugar, that is, when the precipitate turns green instead of yellow, in which case it will be unnecessary to dilute the urine. Place dish over burner and bring the contents to a boil. Pour the urine into a graduated pipette. Now add the urine drop by drop to the contents in the dish until the blue color entirely disappears. This test should be done over several times to assure an accurate calculation. The calculation is made as follows: 5 c.c. of Benedict's

[17] "Treatment of Diabetes Mellitus," pp. 182–183, by Joslin.

quantitative copper solution are reduced by 0.01 gram of glucose, consequently the quantity of undiluted urine required to reduce 5 c.c. Benedict's solution contains 0.01 gram of glucose.

$\frac{0.01}{x} \times 100 =$ per cent. $x =$ c.c. of undiluted urine.

Example: 1500 c.c. urine in 24 hours.

5 c.c. used to reduce (decolorized) Benedict's solution

$\frac{0.01}{5} \times 100 = 0.2$ per cent.

1500×0.002 (0.2 per cent) = 3 grams of sugar in 24 hours.

Example: If the urine had been diluted with 9 parts water, in other words, 10 times, the calculation would be 5 c.c. diluted urine = 0.5 c.c. actual urine. $\frac{0.01}{0.5} \times 100 = 2$ per cent.

1500×0.02 (2 per cent) = 30 grams of sugar in 24 hours.

Hill and Eckman perform the Benedict's quantitative test as follows:[18]

Measure with a pipette 25 c.c. Benedict's solution into a porcelain dish, add 5 or 10 grams approximately of solid sodic carbonate, heat to boiling, and while boiling, run in urine until a white precipitate forms, then add urine more slowly until the last trace of blue disappears. The urine should be diluted so that not less than 10 c.c. will be required to amount of sugar which 25 c.c. of reagent is capable of oxidizing.

Calculation: 5 divided by number of cubic centimeters of urine run in equals per cent of sugar.

Fermentation Test for Quantity of Sugar in Urine. — If the urine is 70° F. (room) temperature when the specific gravity is taken at both the beginning and end of the test, it will assure accuracy.

To 100 c.c. of urine of known specific gravity, add one-fourth of fresh yeast cake thoroughly broken up. Mix thoroughly and set aside at a temperature between 85° and 95° F. for twenty-four hours, after which time test with Benedict's or Fehling's solutions. If reduction is obtained, it will be necessary to allow the

[18] "Starvation (Allen) Treatment for Diabetes Mellitus," by Hill and Eckman.

fermentation to continue until it is complete. When no further reduction is obtained, the specific gravity is taken after the urine has reached a temperature of 76°. The difference in the specific gravity at the beginning and end of the test multiplied by 0.23 gives the percentage of sugar in the urine.

The following formulas represent the various solutions used in the above test:

Benedict's Qualitative Solution

	Gm. or c.c.
Copper sulphate (pure crystals)	17.3
Sodium or potassium citrate	173.0
Sodium carbonate (anhydrous)	100.0
Distilled water to make	1000.0

Fehling's Solution

(1) Copper Sulphate Solution:

34.65 grams copper sulphate dissolved in water and sufficient water added to make 500 c.c.

(2) Alkaline Solution:

125 grams potassium hydroxide.

173 grams Rochelle salts dissolved in water q.s. to make 500 c.c.

Keep solution in separate bottles and mix in equal quantities when ready to use.

Haines's Solution

Copper sulphate (pure) . . . . . 30 grams
(dissolved in ½ oz. (15 c.c.) distilled water)

Add ½ oz. pure glycerine, mix thoroughly, and add 5 oz. liquor potassæ.

Benedict's (Quantitative) Solution

Copper sulphate (pure crystals)	18 grams
Sodium carbonate (crystallized) (or 100 grams of anhydrous salt)	200 grams

Sodium or potassium citrate	200 grams
Potassium sulphocyanide	125 grams
5 per cent solution of potassium ferrocyanide . .	5 c.c.

Distilled water to make total volume of 1000 c.c.

Dissolve the carbonate, citrate, and sulphocyanide with the aid of heat and enough water to make 800 c.c. of mixture. (Filter, if necessary.) Weigh exactly the copper sulphate crystals and dissolve in 100 c.c. of water, now add it to the first solution; stirring constantly. Add the ferrocyanide solution; cool and dilute to exactly 1 liter.

50 mg. (0.050 gm.) of sugar will reduce 25 c.c. of the above solution.

Gerhardt's Ferric Chloride Reaction for Diacetic Acid. — To 10 c.c. of fresh urine, add carefully a few drops at a time of undiluted aqueous solution of ferric chlorid U. S. P. A precipitate of ferric phosphates first forms, but upon the addition of a few more drops of the same solution it is dissolved. A Burgundy red (red wine) color is obtained in the presence of diacetic acid. The depth of this color is indicative of the quantity of acid present. Joslin [19] records the intensity of the reaction as follows, +, ++, +++, or ++++.

According to Joslin, it must be remembered that a similar reaction is obtained in the urine of individuals taking salicylates, antipyrin, cyanates, or acetates, but it is a simple process to differentiate between the color produced as a result of diacetic acid and that produced by the above-mentioned drugs. If the solution is boiled for two minutes, the color from diacetic acid will disappear, owing to the unstableness of that substance, while that from the drugs will remain unchanged.

Test for Acetone. — Pour 5 c.c. of urine to be tested into a test tube, add a crystal of sodium nitroprusside, acidify with glacial acetic acid, shake well, and then make alkaline with ammonium hydrate. The presence of acetone is indicated by a purple color.

Tests for albumen will be found in the chapter on Urinalysis.

[19] "Treatment of Diabetes Mellitus," p. 186, by Joslin.

Diabetes Mellitus is a disease in which the body becomes more or less unable to utilize the sugars and starches, consequently there is an abnormal amount of glucose in the urine.

Manufacture of Sugar in the body from other food constituents besides carbohydrates has been proved with regard to proteins, hence the intake of nitrogenous substances must be restricted in diabetes — to a less extent, however, than the sugars and starches.

Acetone Bodies. — Diacetic acid, oxybutyric acid, and acetone develop in diabetes as a result of the breaking down of the fats and the lack of certain neutralizing agents found chiefly in carbohydrate foods.

Acidosis is a form of intoxication due to the retention of these toxic acids in the body. If not combated and overcome, it will result in the diabetic coma which is fatal in so many cases.

Allen Treatment consists of a period of complete starvation in order to allow the urine to become sugar free, after which a reëducation of the organs by means of determining and utilizing the patient's tolerance for each food constituent is begun. The starvation period lasts from two to four days. The reëducation of the organs begins with the giving of certain green vegetables, containing five per cent carbohydrates, which are further reduced in the sugar content by boiling through three waters. As the body shows by urinalysis an improvement in its ability to utilize the carbohydrates, they are increased in amount and type, passing upward through the foods containing a higher percentage of starch, such as potatoes, oatmeal, and bread.

Preliminary Diets are necessary in certain cases, especially if there is already an evident acidosis. The fats are omitted first, then the proteins and part of the carbohydrates; then all of the carbohydrates.

Alkalies are only given under the direction of a physician. Much harm may be done by the indiscriminate use of soda and like alkalies.

Mild Cases are at times treated merely by reducing the carbohydrates, by reducing the sugar and reducing the bread

allowance 25 grams a day until the urine is sugar free. However, the starvation method shows, as a rule, more rapid and more lasting results.

Examination of Urine is obligatory and should be made at frequent intervals. The amount voided, the color, odor, specific gravity, and chemical composition must be accurately determined in order that one may intelligently cope with the disease.

Training for Diabetic Nursing. — So much depends upon the administration of the treatment in this pathological condition that in many hospitals special training is being given to the nurses in the care of diabetic patients that they may be able intelligently to carry out the necessary régime, both in the hospital and in private practice.

Probably in no other disease is the need for an intelligent and well-trained nurse so clearly demonstrated. Since the treatment is not a question of drugs, but diet, Nature must be helped to help herself, and in no other way is this possible but by careful and vigilant attention to details.

Recognition of Symptoms. — No symptom is too slight to be overlooked, since in this disease the seemingly trivial symptoms may readily indicate the approach of the most dreaded of all complications — diabetic coma.

Special Points. — It is necessary for the nurse to familiarize herself with all the phases of the disease, that she may be competent to cope with the trouble when it arises. For this reason the following rules and regulations are laid down.

Composition and Nutrient Value of Food. — It is absolutely essential that the nurse should know the composition and nutrient value of the various food materials in order to be able to calculate accurately.

The Relation of Foods. — To be able to weigh and measure every article of food included in the dietary and realize the relation which they bear to each other in order to be able to vary the diet by substituting one food for another of like composition, or to substitute in the proper quantity a food of higher carbohydrate content for one containing less of that food constituent.

The Metric System. — She must learn the metric system to be able to calculate any diabetic diet.

Symptoms. — She must be able to recognize symptoms both from the findings resulting from the urinalysis and from those manifested otherwise by the patient.

The Record. — She must keep an absolute record of all that occurs during the course of treatment and instantly report any unusual happening.

Instructing the Patient. — She must instruct the patient in the rules for weighing and measuring and calculating the diet and for making the simple tests for sugar in the urine. She must also instruct her patient in the recognition of symptoms, especially those which may herald the approach of a diabetic coma, namely, restlessness, loss of appetite, unusual fatigue, discomfort, painful or deep breathing, excitement, drowsiness, vertigo, and headache, any of which in themselves seem slight and insignificant, but which in connection with the diabetic condition may be anything but trivial. Any failure on the part of the nurse to report the development of such symptoms would be unpardonable.

Method of Collecting the Urine. — The nurse should collect all the urine voided during the twenty-four hours, beginning at 7 A.M. This should be kept in a bottle sufficiently large to contain the entire quantity. The bottle should be kept in a cool place to prevent decomposition taking place in the urine; further precaution may be used by adding a teaspoonful of some simple preservative, such as chloroform or toluol. When chloroform is used the specimen of urine will have to be heated before it is tested for sugar. After the urine is collected, it should be carefully measured and the entire quantity recorded. The nurse must warn the patient of the necessity for taking account of the urine voided with the stools. After the collection is made, four or five ounces are taken out for analysis.

Urine Tests. — It is advisable to make the tests in the morning; those for sugar and diacetic acid should be made every day or, in some cases, every other day, as directed by the physician, and those for ammonia and albumen about once a week.

Weighing the Patient. — Patient should be weighed each day before breakfast, and the weight of the clothes also carefully recorded separately.

The Bowels must move daily, even if it is necessary to resort to mild laxatives or an enema. Seidlitz powders contain bicarbonate of soda and according to Joslin lead to the appearance of diacetic acid in the urine, if the patient has a low carbohydrate tolerance. Mineral oil is at times used with benefit to overcome the constipation.

Formulating and Calculating the Dietary. — The menus of the day must be formulated and the chemical composition and nutrient value of the foods calculated. The vegetables belonging to the five per cent group should be in readiness and the amount to be used weighed after they have been boiled in clean, separate water to reduce their carbohydrate content still further.

Commercial Diabetic Foods. — It may be well to mention the danger of putting faith in the so-called diabetic foods so widely advertised. Some of these foods are of undoubted worth, but it is never safe for the nurse or the patient to judge of the merits of the various diabetic foods without first knowing their chemical composition, and not even then without the definite directions from the physician.

Diabetic Flours. — The diabetic flours used in the recipes included in this text have been approved by some of the leading specialists in diabetes in this country, but the nurse should not include them in the diet for her patient unless they are prescribed by the physician in charge.

The following flours have been analyzed at the Experiment Station of Connecticut: Hepco Flour, Lister's, and Barker's Gluten Flour. Biscuits or muffins made from these flours, as well as Akoll biscuit, No. 1 Protho Puffs, washed bran muffins, washed coconut cakes, and almond meal cakes are palatable, and furnish agreeable variations when any such foods are allowed.

Sugar-free Milk. — A sugar-free milk has been advised by Williamson. It is made from washed cream as follows: 3 tablespoonfuls of cream are shaken in a pint of water and set aside until

CHAPTER XXIII

DISEASES OF THE LIVER

Much of the so-called biliousness from which the human family is so prone to suffer is nothing more or less than one of Nature's danger signals by means of which man may understand that some part of the delicate organism called the human body is being overworked. Close investigation of these conditions has proved that it is the liver which has been overtaxed, in many cases to such an extent that in a measure it slows down, as any overtaxed machine will do, and has become clogged with material which, owing to its condition, it is not able to prepare properly and send out on time.

Work of the Liver. — When one considers the vast amount of work performed by this organ, one marvels that so little trouble is manifested. In another part of this text the functions of the liver were defined. It was found to be the largest secretory organ in the body, producing a constant supply of bile by means of which the fats were dissolved and the digestion and absorption of the other food materials facilitated. We likewise found that the greater part of the fuel foods was transformed within this organ into available energy, either for immediate or future use.

As a Detoxifying Agent. — To the liver must also be credited the detoxifying of the various poisons produced within the body during the process of metabolism or brought in by way of food. Too much cannot be said as to the value of the liver in this respect, the importance of which is made known as soon as anything happens to the organ to put it even temporarily out of commission.

Causes of Liver Disorders. — Is it any wonder, then, that with such abuses as overeating and drinking, especially of those foods rich in fats and carbohydrates which depend upon the liver

Advice to Patient. — The above menus are merely suggested. The diet may be selected from the list of foods already mentioned. The patient must be warned against overeating and drinking. Pastry, rich cakes and puddings, confectionery, gravies, etc., must be avoided. In certain individuals beer will induce a bilious attack. By them it should be avoided.

CIRRHOSIS OF THE LIVER

The cause of this disease and the stage in which it exists must determine the treatment necessary. However, it matters not what produced the disease, whether it is the result of alcoholism, syphilis, etc., the diet plays an important rôle in its cure.

The Diet. — The diet in this disease, as in any other, must be determined by the condition of the patient. Unfortunately, many patients do not know of their condition until the disease is well advanced and symptoms of obstruction are prominent. A study of these must be made before the diet can be formulated. When the symptoms are mainly those arising from disturbed digestion of the stomach and intestines, without kidney or heart complication, the diet for chronic gastritis is used.

Restricting the Fluids. — When the heart is involved, it is sometimes found necessary to restrict the fluids (dry diet) to 1 quart (about 1000 c.c.) per day. The Karell cure has been used advantageously in many of these cases. In cases where the kidneys are involved, the diet will depend upon the condition of these organs.

Restricting the Diet. — The diet in any case must be restricted. Individuals with a tendency to cirrhosis and those coming of a family in which liver diseases are frequent should be especially warned about the dangers of overeating and drinking. Alcohol should be avoided especially by such individuals. They should keep their diet simple in character and moderate in amounts.

Avoidable Foods. — All foods, such as condiments and spices, meat extracts, the outside browned portions of roasted meat, alcoholic beverages, which exert a stimulating or irritating effect upon the liver, should be studiously avoided and the fats and carbo-

hydrates restricted, since, as it has already been demonstrated, it is upon the liver that the body depends for the preparation of these substances for their utilization. When, for example, the flow of bile is lessened, an incomplete emulsification of the fats exists and the fatty acids which are highly acid in character cannot be efficiently dissolved or neutralized, or when the liver is diseased and for this reason the conversion of glycogen into glucose is interfered with, the utilization of the carbohydrate foods is thus impaired.

GALLSTONES

Factors Influencing Their Formation. — According to Freidenwald and Ruhräh[1] the two factors that in all probability exert the most influence on the formation of gallstones are the stasis of bile and the inflammation of the bile passages and gall bladder.

Dietary Rules. — There are certain dietary rules which should be observed by all persons who have had gallstone attacks. These are (1) to prevent stasis of bile, (2) to avoid fats. Everything should be done to prevent the formation of the stones, and this can only be accomplished by observing these rules. The flow of bile must be free; this is encouraged by keeping the intestinal tract in good condition.

Stimulating Peristalsis. — Peristalsis must not be allowed to become sluggish, for it is only during the process of digestion when the food mass passes along the intestinal canal that there is an ejection of bile into the intestines. When the passage is abnormally slow the bile is in a measure dammed back with a formation of gallstones as a result. The restriction of the fats has already been discussed in another part of the chapter. It has been demonstrated that these substances have a chemical influence upon the formation of gallstones as well as upon the intestinal stasis which leads to their formation.

Dietetic Treatment. — Hence the diet should be so directed as to (1) increase the flow of bile, and (2) to avoid all foods that are liable to cause indigestion which may bring about putrefaction

[1] "Diet in Health and Disease," p. 399, by Freidenwald and Ruhräh.

in the intestinal tract and a consequent irritation and inflammation of the bile passages and gall bladder.

The meals should be regular and an abundant diet advised to increase the flow of bile and stimulate peristalsis in the intestines.

Exercise. — Exercise is especially recommended. Horseback riding, swimming, rowing, golf, and tennis are especially valuable in forcing the bile from the gall bladder and liver.

The Clothing. — The clothing should be loose enough to be perfectly comfortable. Certain cases of gallstone attacks in women have been said to have been traced to tight lacing, which interfered with the normal flow of the bile.

The Bowels. — Constipation should be avoided, and the diet should be directed with this point in view. The meals must be frequent, ranging from four to six a day. In this way only is the flow of bile encouraged. The breakfast should be ample in order to utilize the bile secreted in the night season. With all this, care must be observed not to give more food than can be adequately handled by the digestive apparatus, since food which is not digested becomes a prey to the actions of the putrefactive bacteria which infest it, and the toxic substance thus formed produces the very result which all of our efforts are directed to prevent.

Available Foods. — The following foods **low in fats** may be used in formulating the diet:

Soups: Meat broth (made from lean meat) from which all the fat has been removed.

Meats: Lean beef, lamb, chicken, squab, quail, lean fish (in small quantities and not too frequently).

Green vegetables: Except peas and carrots; beets and turnips may be taken sparingly.

Fruits: Oranges, lemons, grapefruit, and unsweetened stewed fruit.

Cereals: Wheat cereals, oatmeal, rice, and tapioca in moderation.

Bread: Whole wheat, white, rye, and graham bread, toast, and crackers.

Fluids: Weak tea and coffee (without cream, and a little sugar), orange and lemonade, mineral waters, water, skimmed milk, whey.

Eggs: (except hard-cooked or fried).

Desserts: Fruit gelatine, fruit whips, raw or stewed fruit.

Avoid the following foods: Fats, oils, mutton, liver, brains, sardines, and caviar, oily fish, rich gravies and sauces, sweet fruit, peas, carrots, condiments and spices, pastry and confectionery, pickles, alcoholic beverages. Restrict carbohydrates, yolks of eggs, milk (cream must be skimmed off if too rich).

DAILY DIET SHEETS

I

Breakfast — Baked apple with milk
Cream of wheat with milk
Weak coffee or tea
Dry toast

11:30 A.M. — 6 oz. orange juice, 1 egg white

Dinner — Beef broth (well skimmed) with crackers
Rice
Stewed pears
Weak tea
Toast or rolls

3:30 P.M. — Albumenized fruit juice with crackers

Supper — Wheatena with milk
Milk toast
Stewed prunes
Toast and tea

9 P.M. — Well-skimmed chicken broth with crackers

II

Breakfast — Stewed apples with milk
Milk toast
Coffee without cream

10:30 A.M. — Well-skimmed broth with crackers

Dinner — Tomato bouillon with crackers
Baked potato — 1 small potato
Purée of spinach
Orange gelatine
Toast

3 P.M. — Albumenized lemonade

Supper — Oatmeal or cream of wheat with milk
Toast
Tea
Stewed fruit

9 P.M. — Well-skimmed broth with crackers

III

Breakfast — Grapefruit
Oatmeal with milk
Toast
Weak coffee

10:30 A.M. — Orangeade with graham crackers

Dinner — Cream of spinach soup (skimmed milk)
Small piece of the breast of chicken
Mashed or boiled potatoes
Asparagus on toast
Sliced oranges

3:30 P.M. — Well-skimmed broth with crackers

Supper — Farina or cream of wheat or wheatena, with milk
Baked potato
Baked apple with milk
Toast and tea

9 P.M. — Albumenized orange juice

IV

Breakfast — Sliced oranges
Oatmeal
Toast
Coffee

10 : 30 A.M. — Beef gruel, 6 oz.

Dinner — Cream of asparagus soup, skimmed milk
Thin slice of roast beef or whitefish
Rice or potatoes
Tender string beans
Fruit
Toast
Buttermilk

3 : 30 P.M. — Orangeade

Supper — Stewed fruit with puffed wheat or rice
Milk toast
Tea

9 P.M. — Broth

SUMMARY

Functions of Liver. — To transform fuel foods into available energy; to detoxify those poisonous substances produced as the result of metabolism of body tissue or brought in in food, and to select those available for use; to secrete bile.

Factors Influencing Disorder of Liver. — Errors in diet: (*a*) overeating; (*b*) excessive drinking; and (*c*) unbalanced diet, especially as regards the amount of fats and carbohydrates in the diet.

The Bowels, in most of the disturbances affecting the liver, become constipated, thus causing much additional work on the part of the liver in handling the products produced as the result of putrefactive bacteria upon the accumulated mass in the colon.

Tissue Changes in the liver have been caused by the taking of alcohol, which should therefore be avoided by all individuals having any disease involving the liver and by those with a predisposition to liver disturbances.

Exercise and Lack of Exercise are potent factors in the treatment of conditions involving the liver. First, because the liver requires exercise to enable it to empty itself more completely and assure a free flow of bile; second, because exercise directly affects the energy output of the body, causing an increased rate of metabolism and a better utilization of the food ingested. Lack of exercise acts in exactly the opposite direction, and it has been found that with the majority of patients suffering from diseases of the liver too little exercise and too much food are at the bottom of the trouble.

Dietetic Treatment in the majority of diseases affecting the liver is much the same. The keynote in each is a balanced diet. Constant overeating and excessive drinking have proved the foundation of the majority of such diseases, especially of the bilious type, while an excess of fat and carbohydrates in the diet lead to the more serious disorders.

Biliousness requires abstinence from food for a short period and a cleansing of the entire gastro-intestinal tract, the measures being directed by the physician. After the bilious symptoms have subsided, a simple, well-regulated diet should be established, in which no rich foods of any sort are allowed. All condiments and spices which have an astringent effect upon the bowels are strictly prohibited, and alcoholic beverages had best be eliminated from the diet.

Cirrhosis of the liver is apt to be insidious in its development, taking a firm hold before the character of the disorder is discovered. Dietetic treatment of this disturbance is most important and should be directed toward overcoming not only the liver symptoms but other symptoms as well.

Gastro-intestinal Disturbances, manifested in cirrhosis of the liver, are treated by the diet used in chronic gastritis (see p. 230).

Heart Symptoms sometimes occur during the course of the disease and require especial attention to the diet. The fluids at times must be restricted, in which case a modification of the Karell Cure will prove valuable (see p. 310).

Kidney Complications develop in a certain percentage of cases, and it then becomes necessary to institute one of the various diets devised to meet the needs of those special conditions (see Chapter XX).

Restricting the Diet will be found to be necessary for those individuals showing a tendency to cirrhosis, also for those in whose family diseases of the liver are of frequent occurrence. Such individuals should be warned of the dangers arising from over-indulgence in food or alcoholic beverages.

Prohibited Foods are those which by reason of their astringent qualities favor the development of constipation, such as condiments and spices; those foods which exert a stimulating and irritating effect upon the liver and bile passages, such as alcohol, malt extractives, etc.; and fats and carbohydrates in excessive quantities, on account of the extra amount of work required of the liver in order to make them available in the body.

Gallstones develop as the result of inflammation or clogging of the bile passages.

Treatment is dietetic in character and is directed toward relieving or preventing inflammation in the bile passages, also in stimulating the flow of bile in order that it may not become sluggish and thus give rise to the development of the gallstones.

The Fats, therefore, must be restricted in the diet, as they, more than any of the other food constituents, favor the above conditions.

Peristalsis in the intestinal tract must be stimulated to facilitate a free flow of bile, which will not occur where the movements are sluggish. Stasis of the bile must be prevented or stones will be apt to form.

Dietetic Treatment for gallstones is therefore directed to increase the flow of bile and to avoid the inflammation of the gall bladder and bile passages which may result from the product of intestinal putrefaction.

The Diet consists of foods simple in character, low in fats, but abundant in quantity, in order to prevent constipation. It must be selected carefully that digestional disturbances may not develop.

The Meals should be frequent, from four to six a day, in order to encourage a free flow of bile.

Breakfast should be ample in order that the bile secreted and accumulated during the night may be utilized as soon as possible.

Constipation must be avoided, and the foods particularly adapted to prevent or overcome this condition should have a prominent place in the diet. Any accumulation of unabsorbed food in the lower intestines becomes a breeding ground for putrefactive bacteria, the product of whose activity imposes a serious tax upon an already overworked organ.

CHAPTER XXIV

GOUT, OBESITY, EMACIATION

GOUT is a constitutional disease characterized by an inflammatory condition of the joints. It is caused by or associated with a retention of uric acid in the blood. Gout is also characterized by the deposit of uric acid or sodium salts which occurs in different parts of the body, the joints, the lobe of the ear, the knee and the elbow being common points where the deposit of these salts ordinarily occurs. The amount of uric acid is lessened in the urine in cases of true gout, except in acute attacks, and in this way it is distinguished from the so-called goutiness in which a urinalysis shows an excess of uric acid. According to Strouse, this excess of uric acid in the urine "means a physical-chemical change in the urine and is quite different from the small amount usually excreted." [1]

Source of Uric Acid. — In man the uric acid which is eliminated in the urine is derived from two sources. It may be taken with the body as purins in food, in which case it is spoken of as being an "exogenous" product, or it may be formed in the body from the breaking down of the nucleoproteins (the highly nucleated cells of the glandular organs particularly). When the uric acid is formed in this manner as the result of the metabolism of the body tissues, it is known as "endogenous." In the normal body approximately one-half of the uric acid formed is oxidized, while the remaining half is eliminated from the body by way of the urine.

Elimination of Uric Acid. — In gout such is not the case, the body loses to a certain extent the ability to eliminate the uric acid, hence it is retained within the body, causing an excess in the blood stream, and it is this excess uric acid in the blood which causes the

[1] "Food for the Sick," p. 97, by Strouse and Perry.

acute attacks and general pain and discomfort which inevitably occur in chronic gout.

Purin-bearing Foods as Sources of Uric Acid. — Formerly no difference was made in food; all were supposed to cause uric acid formation, but with the exhaustive investigation of food materials this sweeping condemnation has been to a great extent removed or narrowed down to a few foods, those rich in purins being the chief offenders.

Chief Causes of Gout. — Without a doubt, overeating, over-indulgence in alcoholic stimulation, lack of exercise, etc., are chiefly to blame for the large percentage of the cases, but upon investigation it will be seen that those individuals are as a rule large protein eaters and that their mode of living is not such as to assist the body in throwing off the poisons which form as the result of their self-indulgence.

Rules to Combat Gout. — To successfully combat the retention of a large percentage of uric acid in the blood there are certain definite rules to be observed: (1) The general diet must be reduced not only in amount but also in purin-bearing foods; (2) All foods which are liable to cause digestional disturbances, with the attending evils of intestinal putrefaction and constipation, must be avoided.

Alcohol in Gout. — If the patient is accustomed to alcoholic stimulants and has been in the habit of taking them constantly for years, the amount of alcohol consumed daily must be radically reduced and only the amount prescribed by the physician taken. Alcohol without a doubt assists in the retention and increases the difficulty of uric acid elimination by the body. In view of the present knowledge of the cause and effect of uric acid in the body, the treatment of gout is directed with the object of relieving the condition (1) by facilitating the elimination of uric acid from the body, and (2) by so regulating the diet as to exclude as far as possible those purin-bearing foods which, by reason of their chemical composition, augment the general amount of uric acid formed within the organism.

In gout, as in other abnormal conditions, no set rule can be laid down to cover the treatment of every case. The individual

must be taken into consideration, his daily habits studied and the extent and character of the disease known before it is possible to prescribe a treatment or formulate a diet which would adequately meet his needs under the existing conditions.

Obesity and Glycosuria. — Gouty individuals often become obese and show evidences of glycosuria. Consequently it is important to regulate the carbohydrates as well as the purin-bearing foods in the diet. Only the simplest foods are permissible. In acute attacks it has been found that milk and alcohol cause less disturbance than meat and alcohol. While the acute symptoms exist all meat should be avoided and the daily allowance of alcohol cut down. Tea and coffee both contain purins and should be avoided while the acute stage of the disease continues. Cereal coffee, hot water, tea or hot milk or buttermilk may be substituted.

Purin-free Diet. — A purin-free diet is advisable during the acute attack. The following is a sample menu of such a diet:

Breakfast — Banana, apple, grapefruit, orange or peach, etc.
Cereals: farina, hominy, or cream of wheat with cream and sugar
1 egg, soft cooked
Buttered toast
Cereal coffee with sugar and cream or hot-water tea (milk and hot water) with cream and sugar

Lunch or Dinner — Poached egg on toast, 1 large baked potato with butter, 1 mold of fruit jelly with cream

Supper — Rice and butter, bread or toast with hot milk.
Apple sauce with cream.

	Purin Per Cent
Cocoa contains	1.00 per pint
Tea "	1.20 per pint
Coffee "	1.70 per pint

Purins are soluble in water, hence those foods that are boiled contain less than those prepared by other methods of cookery.

Foods More or Less Condemned. — Salt has a tendency to bring about a deposit of sodium urates in the body, and for this reason should be sparingly used in the preparation of the diet. Alkaline waters are inclined to produce a like result, consequently should be avoided by the gouty individual. Condiments and spices are conducive to constipation, a condition to be avoided if possible under the circumstances. Certain physicians prohibit the use of oranges in the diet of gout, while others do not. Strawberries are likewise condemned and should be eliminated from the diet for both chronic and acute gout.

Diet in Chronic Gout. — In chronic gout it is necessary to maintain the general health of the patient by a well-balanced diet. This is not difficult even if the dietary is so regulated as to be well within the limits of his energy requirements. It is necessary to limit the purin-bearing foods. Meats are used sparingly and these should be boiled rather than roasted or broiled. Eggs and cheese and milk should be substituted for at least part of the regular allowance of meat.

Exercise and Massage. — The patient should be recommended to take a certain amount of mild exercise in the open air or massage if he is accustomed to living an indoor life or is confined to office work. He must be warned against over-indulgences of all kinds, especially of overeating and drinking. A glass or two of hot water before breakfast is recommended.

Treatment of Obesity. — The treatment of obesity when occurring in gouty patients is much like that used in other conditions. Ebstein regards obesity under such circumstances as an unfavorable symptom. He advises a reduction in the carbohydrates to the smallest possible amount and allows meat and fats in the diet.

Allowable Foods. — The following foods are practically purin-free and may be used in the diet for gout:[2] Milk, cheese, butter, eggs, nuts, gelatine, fruits, sugar, breads made with white flour,

[2] The amount of food must be limited, since overeating will precipitate an acute attack. It is best to limit the amount to about a maintenance allowance or a little more, temporarily.

cereals, cream of wheat, farina, rice, hominy, tapioca, cornstarch, potatoes and other root vegetables, green vegetables, except asparagus, spinach, and all fats.

Avoidable Foods. — The following foods are rich in purins and should be avoided in the diet for gout: Sweetbreads, liver, kidneys, beef, mutton, veal, pork, turkey, chicken, goose, rabbit, duck and other game, fish, with the exception of cod, sardines, and anchovies, tea, coffee, and cocoa.

The following list shows the purin content of some of the above-mentioned foods. The purins are computed by Hall as follows: 1 kilogram contains,

	Grams Purin		Grams Purin
Milk		Flour	
Butter		Bread	
Eggs		Cauliflower	
Cheese		Eggplant	
Farina		Cabbage	
Rice		Lettuce	
Hominy		Sugar	
Potato	0.02	Peas	0.39
Asparagus	0.21	Oatmeal	0.53
Lentils	0.38	Beans	0.63
Halibut	1.00	Chicken	1.20
Cod	.05	Sherry	
Salmon	1.00	Claret	
Mutton	0.96	Whisky	
Beef	1.10–2.00	Brandy	
Veal	1.10	Beer	0.12
Ham	1.10	Porter	0.14
Pork	1.20	Ale	0.14
		Chocolate	0.70 per pint

To keep the body in good condition and to help rid it of accumulated poisons, the following diet lists are recommended:

Daily Dietaries:

7 A.M. — Hot water, 8 oz.

8 A.M.

Breakfast — Stewed prunes, wheatena and cream
2 eggs
2 slices of buttered toast
1 cup of milk flavored with cocoa or coffee or 1 cup of cereal coffee with cream

Dinner — Cream of pea soup
Boiled codfish with cream sauce
Mashed potatoes
Cauliflower
Rice pudding

Supper — Cream toast
Baked potatoes
Egg nest
Apple sauce
Hot milk flavored with coffee, cocoa, or 1 cup of cereal coffee

7 A.M. — Hot water, 8 oz.

8 A.M.
Breakfast — Grapefruit
Cereal and cream
Soft scrambled eggs
Cereal coffee, or milk and coffee
Buttered toast

12 : 30
Lunch — Cream of tomato soup
Cottage cheese and cream
Baked potato
Baked apple
Bread and butter

6 P.M.
Dinner — Chicken, small piece, no gravy or rich dressing
Candied sweet potatoes
Baked eggplant
Lettuce salad (lemon juice instead of vinegar)
Bread and butter
Orange or wine jelly
Milk

Breakfast — Cereal and cream
Baked apple with cream
1 slice of bacon
1 soft-cooked egg
Toast — butter
Cereal coffee, or milk flavored with coffee

Lunch — Vegetable soup
Scalloped potatoes
Cream cheese
Bread, butter
Stewed pears

Dinner — Halibut steak
Creamed potatoes
String beans
Fruit salad
Sponge cake, orange sauce
Small coffee

OBESITY

Probably no one problem affecting the human family is more widely discussed than that of obesity. There are numberless "cures" suggested, most of which contain some good, but they are as a rule more strenuous than the average fat person cares to attempt, or, if attempted, persist in.

Causes of Obesity. — It is stated that at least fifty per cent of the obesity is of hereditary origin, while the rest may be due to overeating and drinking, unbalanced diets, metabolic changes due to the approach of menopause in women, and diseases such as gout in which there is a certain amount of disturbance in the blood and excretory organs and in which the diet or the disease may be accountable for the gain of surplus adipose tissue. Women approaching menopause may not change their diet in the least and there may still be the noticeable increase of fat.

Obesity Cures. — A great number of the "cures" are undertaken not from a health standpoint but from the esthetic point

entirely. It makes no difference what reason is brought forward for instituting the treatment, it is the results which count. Of the cures undertaken which are in themselves good, but which are too strenuous for the average "fat person" to stick to may be mentioned some of the early cures instituted and recommended by Banting, Oertel, and Ebstein. Obesity, then, may be said to be due to (1) heredity, (2) overeating and drinking, (3) lack of exercise (sedentary life), (4) a combination of the above causes. Whether the obesity is due to the lack of exercise or the lack of exercise is due to the accumulation of fat which causes a disinclination to move on the part of the individual, can only be judged when a thorough examination into the life and habits of the patient is made.

Comparison of Food Intake and Energy Output. — Many fat people who claim to be small eaters in reality constantly consume more food than their age, weight, or mode of living would necessitate. If such patients could be prevailed upon to keep a correct chart of their daily intake of food and the amount of exercise taken, they would be astounded to find how much greater was the intake in comparison to the output of energy, in other words, how much more food they ate than they required to keep them in health. A glance at the first tables in this text will show which foods are utilized by the body chiefly as a source of energy.

Uses of Food in Body. — Physiological chemistry proves that when more food is taken than is needed for the internal and external work of the body, the surplus is stored for future use, first, in the liver and muscles as glycogen for the general expenditures, and, second, as adipose tissue for future use. Thus it is seen that when the intake is constantly greater than the energy expenditure there must necessarily be some way in which the body can store up her surplus fuel, and so long as the digestion remains good and the amount of exercise limited there is no reason why there should not be a constant and steady accumulation of surplus fat which inevitably terminates in obesity.

Water as a Fat Maker. — That water is in itself fattening is of course untrue. A chemical analysis of this fluid shows that it is inorganic in character and cannot alone either produce energy

or build tissue. However, this food constituent plays a most important part in all the functions of the body. In the first place the body cannot utilize food unless it is in solution; water is also one of the best known stimuli to the flow of gastric juice, and for this reason is an important factor in the preparation of the food for its absorption and utilization; since water forms the bulk of the blood, it acts as a distributer or carrier of food to the different parts of the body.

Limiting the Fluids in Obesity. — Thus it is seen that when the intake of fluids is limited, the body will call upon that surplus which is stored in every nerve, tissue, and fluid throughout the entire organism to assist in the necessary work of the organs, thus reducing the body weight just that much.

Exercise. — The athlete who is overweight, due to adipose tissue, increases his exercise at times, even adding to the weight of his clothing, causing an increased energy output, profuse perspiration, etc., all of which causes the body to use her surplus fuel in the form of the stored fat. Exercise does not break down a muscle, it builds it up. Thus many individuals who increase the strenuousness of their exercise complain that their weight is increased even when they observe a noticeable improvement in their general feelings and appearance.

The Appetite. — The great trouble with most women who undertake an obesity cure which calls for an increased amount of energy is that they will develop an increased appetite thereby which they appease with food instead of forcing the body to use the store in hand, thus entirely doing away with any good the treatment might have accomplished. No amount of exercise without a proper regulation of the diet will prove satisfactory as far as the reduction of fat is concerned. The following methods recommended by Banting, Oertel, and Ebstein are included here.

OBESITY DIETS AND CURES

Banting Method. — This method is said to be unsuited to those with weak digestions. Following its use such individuals have been known to develop renal colic or gallstones; constipation

may be present and the entire system may become so deranged as to render the patient liable to disease.[3]

Banting Diet for Obesity. — Breakfast at 9 A.M., consisting of 5–6 ounces of animal food, meat or boiled fish (except pork or veal), 1 small biscuit or 1 ounce dry toast. Total solids, 5–6 ounces. Coffee or tea (without milk or sugar), 9 ounces.

2 P.M. — Dinner: Fish or meat (salmon, eels, herring, pork, and veal excepted), poultry or game; any vegetable except potatoes, parsnips, carrots, turnips, or beet roots; dry toast, 1 ounce; fruit cooked and unsweetened; good claret, sherry, or Madeira, 10 ounces. Total solids, 10–12 ounces.

6 P.M. — Tea: 2–3 ounces cooked fruit; 1–2 ounces rusks; 24-ounces solids; 9 ounces tea, without milk or sugar.

7 P.M. — Supper: Meat or fish as at dinner; claret or sherry and water, 7 ounces.

Total daily solids, 21–27 ounces.

Total fluids, 35 ounces.

Oertel pointed out the great benefits which might be derived by those individuals suffering from certain types of heart disease which are accompanied by obesity. He made it distinctly understood that while the treatment in no way affected the heart lesion, — that is, in so far as altering the character of the disease, — it greatly reduced the work imposed upon the circulatory organ and permitted a more complete oxidation of the blood.[4]

Oertel's Method. — Oertel bases his dietetic treatment of obesity upon the heart changes and those which naturally follow in the circulation. He makes the following suggestions, taking always into consideration the condition of the patient, whether he is anemic or plethoric.

"(*a*) Where there is an abnormally increased amount of fat in plethoric patients with unimpaired or only beginning changes in the heart action, the diet should aim at:

(1) An increased supply of protein.

(2) A decrease in the fat-forming substances.

[3] "Diet in Health and Disease," by Freidenwald and Ruhrāh.

[4] *Ibid.*, p. 544, by Freidenwald and Ruhrāh.

(3) Little or no diminution in the supply of liquids below the physiologic amount (1500 c.c.–3 pt.)

(*b*) Where there is obesity in anemic patients, viz. serious plethora, the diet should aim at:

(1) An increase in the quantity of proteins.

(2) A diminution in amount of fat-forming substances and eventually

(3) A decrease in the amount of fluid.

(*c*) Where there is obesity in adults with anemic symptoms in whom not only the amount of protein but also the abnormally increased amount of fat is slowly wasting away, they require:

(1) An increase in the amount of protein taken.

(2) A sufficient amount of fat and carbohydrates or even an increase of same to prevent the falling off of fat.

(3) A diminution in the amount of fluid taken."

Oertel claims that the simplest method of reducing the fat-forming elements in a diet is to decrease the amount of fat and allow a certain amount of carbohydrates, regulating the diet according to the individual. The following table is given by him as showing the minimum and maximum amount of the different food constituents constituting the obesity diet:

	Protein Gm.	*Fat Gm.*	*Carbo-hydrate Gm.*	*Calories*
Minimum	156	25	75	1180
Maximum	170	45	120	1608

In instituting a treatment for obesity Oertel insists upon a certain amount of exercise daily in the open air, the amount to be regulated by the physician according to the individual case. He suggests that five or six small meals a day be given rather than a few large meals. He eliminates soups, tea, and coffee while the cure is being given.

Ebstein suggests a diet in which the carbohydrates and fluids are reduced but in which the fats are allowed to a considerable

extent. The diet consists of meat, eggs, fish, vegetables (green) and fruits. The following menu demonstrates his dietary régime:

Breakfast: Large cup of tea (no milk or sugar); 2 oz. bread with plenty of butter.

Dinner: Soup 4½ to 5½ oz.; meat with fat sauce; green vegetables; fresh fruit; 2–3 glasses light wine.

Afternoon: Tea as at breakfast.

Supper: Tea, 1 egg, fat roast meat or ham, smoked fish; about 1 oz. bread with plenty of butter; a little cheese and fresh fruit; potatoes, sweets and sugars forbidden.

Dietetic Treatment. — The following menus are suggested by the author: The carbohydrates and fats are restricted and the fluids reduced to a minimum. The meals as far as possible are kept "dry"; soups, milk, cocoa are avoided; water is not permitted at meals; alcoholic beverages, white bread, butter, potatoes, sugar, candy, pastry, cakes, puddings, gravies, sauces, bread dressings, griddle cakes, sirups, molasses, honey, ice cream, cereals, pork of all sorts, ham, bacon, pork chops, etc., olive oil, spaghetti, macaroni, and noodles are prohibited.

Allowable Foods. — The following foods are allowed: Black coffee or tea, small cup twice daily without milk, cream, or sugar — saccharine may be used to sweeten if desired; fresh or stewed fruit with the exception of bananas, raisins, and dates, served without sugar; all green vegetables cooked or served without butter or fat of any description; salads, except potato or banana, served with a special dressing (no oil or sugar); water ices; watermelon and other melons served without sugar; 1 egg a day; gluten toast, no butter; brown bread or muffins made with gluten flour and prepared bran.

The following menus may be used as guides in the treatment of obesity:

Breakfast — 1 sliced orange (no sugar)
1 small cup coffee or tea without cream, milk, or sugar (sweeten with saccharine if desired)
1 poached egg on
1 slice of gluten toast (no butter)

Lunch — Cottage cheese and lettuce salad with special dressing
2 broiled lamb chops

1 slice gluten bread; 3 ounces (1 serving) apple sauce (sweetened if necessary with saccharine)

Dinner — Roast beef
Spinach or greens (cooked without fat meat)
Green peas
Tomato and lettuce salad with special dressing
Orange or wine jelly (sweetened with saccharine)
1 slice of gluten bread or toast

7 A.M. or 1 hour before breakfast — 1 cup of water containing juice of ½ lemon.

Breakfast — ½ grapefruit without sugar
1 small cup black coffee or tea
Beefsteak broiled and served without butter (lean)
1 slice of gluten toast

Lunch — Tuna fish salad (no olive oil in dressing)
1 bran muffin or 1 slice (1 oz.) gluten toast
1 baked apple (without cream or sugar)

Dinner — Roast or boiled chicken (no gravy or bread dressing)
Green vegetables (peas, string beans, cabbage,[5] turnips, artichokes (without butter)).
Fruit salad (special dressing).
Lemon ice.

Amount of Food. — The amount of food is limited to a certain extent. Green vegetables may be eaten in abundance, but the protein foods such as meat, fish and eggs must be limited.[6] The bread (even gluten and bran breads) must be limited to 1–2 slices at each meal. All meals are eaten without fluids except breakfast, when one small cup of coffee or tea without milk, cream, or sugar is allowed. If fruit juice is to be served instead of fruit, it must be prepared with little if any water and no sugar. The juice may be poured over cracked ice, if desired.

The following reducing diet is suggested by Dr. Rose for the use of over-fat women:

[5] Boiled vegetable dinners must be prepared without fat meat and potatoes.

[6] Scientific investigation has proved that both carbohydrates and fats may be formed in the body from protein. Hence any excess above that required to keep the body in nitrogen equilibrium is utilized by the organism for fuel or stored as fat.

REDUCING DIET FOR OBESE WOMEN[7]

Fuel value 1052 calories — ordinary requirements 2200 calories

	Measure	*Weight Oz.*	*Protein Calories*	*Total Calories*
Breakfast				
Apple	1 medium	4.9	2	65
Egg	1 egg	2.4	27	75
Toast	1 slice	0.5	7	50
Coffee[7]	1 cup			
Skim milk	1½ tbs.	1.0	3	10
10:30 A.M.				
Bouillon	½ cup	4.0	10	12
Water cracker	1 cracker	0.1	1	10
Luncheon				
Lean cold roast beef	Medium serving	3.5	97	150
Rye bread	2 thin slices	0.7	7	50
Lettuce and cottage cheese salad:				
Lettuce	Ad libitum		40	85
Cheese	2½ tbs.			
4:30 P.M.				
Tea with lemon[8]	1 cup			
Water cracker	1 cracker	0.1	1	10
Dinner				
Boiled cod with lemon	Large serving	8.2	209	225
Boiled potato	½ medium	1.8	6	50
Cauliflower (plain)	Large serving	3.0	6	25
Butter	1 tsp. (scant)	0.1		30
Watercress and egg salad:				
Watercress	Ad libitum			
Egg	1 egg		27	110
French dressing	½ tbs.			
Orange	½ large	4.7	3	50
Black coffee	Demi-tasse			
10:30 P.M.				
Hot skim milk	½ cup	4.3	16	45
Total calories				1052

[7] "Feeding the Family," p. 84, by Mary Swartz Rose.

[8] Saccharine may be used to sweeten.

AUTHOR'S REDUCING DIET

Approximate fuel value 965.5

Material	*Amount*	*Protein Gm.*	*Carbohydrate Gm.*	*Fat Gm.*	*Calories*
Breakfast					
Orange	1 medium	1.5	17.4	0.3	78.3
Poached egg on Toast (gluten)	1 egg 1 slice (1 oz.)	5.3 8.4	 8.5	4.6 0.3	62.6 70.3
Coffee (black)	1 cup				
					211.2
Luncheon					
Lettuce and cottage cheese salad:					
Lettuce	Ad libitum				
Cheese	2 tbs.	5.9	1.2	0.2	30.2
Dressing	1 tbs.	1.5		3.4	36.6
Lamb chop	1 chop	9.2		12.7	151.3
Gluten bread or toast	1 slice	8.9	8.5	0.3	70.3
Apple sauce	1 serving about ⅓ cup	0.6	22.5	.7	97.5
					385.9
Dinner					
Roast beef	2 thin slices (2 oz.)	11.4		4.8	88.8
Spinach	½ cup	2.3	3.6	0.3	26.3
Green peas	½ cup	4.8	11.1	0.2	65.4
Lettuce	Ad libitum				
Tomato	1 medium	0.4	3.1	0.2	15.8
Dressing	1 tbs.	1.5		3.4	36.6
Orange jelly:					
Orange juice	½ cup (8 tbs.)		14.2		56.8
Lemon juice	1 tbs.				
Gelatine	1 tsp.	2.1			8.4
Water	1 tbs.				
Saccharine	1 tablet or less				
Bread, gluten	1 slice	8.4	8.5	0.3	70.3
Total grams		72.2	98.6	31.7	368.4
Total calories					965.5

AUTHOR'S REDUCING DIET — *Continued*

Approximate fuel value 930.5

Material	*Amount*	*Protein Gm.*	*Carbohydrate Gm.*	*Fat Gm.*	*Calories*
Breakfast					
Fruit	1 orange	0.85	12.05	0.15	53.0
Gluten toast	2 slices	17.8	17.0	0.6	140.0
Egg (poached or soft cooked)	1 egg	5.3		4.6	60.0
Coffee	1 cup				
					253.0
Luncheon					
Oyster cocktail	6 oysters	3.5	4.20	0.68	37.0
Cold roast beef	1 slice (1 oz.)	5.7		2.4	44.0
Coleslaw:	½ cup				
Cabbage	½ cup	0.002	0.001	0.034	4.5
Dressing	1 tbs.	1.5		3.4	36.0
Gluten toast	2 slices	17.8	17.0	0.6	140.0
					261.5
Dinner					
Chicken (without stuffing)	3 oz. one serving	18.2		2.1	92.0
Broiled mushrooms	6 medium size	1.5	3.0	0.18	19.0
String beans	3 oz. one serving	1.95	6.29	2.29	34.4
Pineapple salad:					
Lettuce	Ad libitum				
Pineapple	1 slice	4.0	31.0	0.6	129.5
Dressing	1 tbs.	1.5		2.4	37.0
Apple float					
1 apple	1 apple	0.6	22.2	0.77	98.1
½ egg white	½ egg white	1.5	0.02		6.0
Saccharine to sweeten					
					416.0
Total calories					930.5

Rules and Regulations. — The following directions and menus are given to be used when a reduction in weight is necessary. Care must be taken not to allow large amounts of even the non-fat-forming foods in the dietary, since under certain conditions the body will manufacture adipose tissue of any surplus organic

material ingested. Breakfast must be limited as demonstrated in the tabulated diet sheet.

Keeping the Weight Down. — After the individual has been reduced to approximately the desired weight the diet may be made a trifle more liberal, keeping in mind, however, that moderation is the keynote in the obesity régime and will have to be practiced to a certain extent always. It is wise to continue the dry meals and to limit the amount of butter, cream, and other "fatty foods," to a certain extent. Pork, with the exception of crisp bacon several times a week at breakfast, had best be avoided, and alcoholic beverages should be omitted entirely except when prescribed by the physician. The outdoor exercise should be continued and only the amount of sleep requisite to health indulged in. If the individual will faithfully carry out these directions, there is no reason why the weight should continue to be a burden. It must be remembered that it is never safe to diet indiscriminately and without the advice of a physician, since much harm may come of so doing.

Value of Massage. — Massage is an advisable accompaniment to an obesity diet and will help to prevent a sagging of the tissues which have been deprived of the supporting fat. The tissues of the face, neck, and breast are especially apt to wrinkle unless given the exercise and stimulation from massage. **Cold baths** are likewise advisable, since they stimulate the body to burn up the fat.

OBESITY MENUS

Lunch — Tuna fish salad
Cauliflower
Baked apple

Dinner — Soft-shell crabs
Roast lamb
Spinach
Tomato jelly
Grapefruit

Lunch — Corned beef and cabbage
Stewed pears

Dinner — Clam cocktail
Roast chicken
Asparagus
Fruit salad

Lunch — Broiled oysters; cold lamb
Boiled turnips
Water-cress salad

Dinner — Roast-beef
Stewed tomatoes
String beans
Lettuce and tomato salad
Sliced peaches

Lunch — Broiled calves' liver
Greens (mustard, turnip, beet tops, or dandelion)
Orange jelly

Dinner — Crab-flake cocktail
Broiled squab
Artichokes
Stewed celery
Lettuce, Russian dressing

Lunch — Kippered herring
Veal croquettes (baked instead of fried, with tomato sauce; this dressing is made by adding 1 teaspoonful of chili sauce to the regular dressing used in obesity diets)
Asparagus
Apple sauce

Dinner — Baked halibut steak, stuffed with oysters
Boiled onions
Boiled carrots
Pineapple and grapefruit salad

Lunch — Broiled calves' brains
Vegetable salad
Melon

Dinner — Broiled chicken
Boiled beets
String beans
Cucumber and young onion salad
Raspberry ice

Lunch — Stuffed eggs
Sliced tongue with spinach or greens
Carrots or beets
Fruit

Dinner — Roast turkey, cranberry sauce
Cauliflower
Tomatoes stuffed with celery, green peppers and onion dressing
Peach whip

Lunch — Hashed beef
Boiled onions
Stewed prunes

Dinner — Oysters
Baked rabbit
Eggplant (baked)
Spinach
Fruit jelly

EMACIATION

Emaciation as a rule is a symptom of an abnormal condition rather than a disease in itself. Certain individuals are said to be " constitutionally thin " and upon investigation it is often found that this thinness extends back in many cases for generations, many members of a family being thin no matter what measures are taken to overcome the condition. However, constitutional emaciation is not so prevalent as constitutional obesity and, as

has already been stated, is more often a symptom of some metabolic disturbance or pathological condition.

Causes of Emaciation. — **Errors in diet** — insufficient or improper food — are accountable for most of the cases seen in infants and children. **Over-exercise**, that is, when the amount of exercise taken is not commensurate with the intake of food, is accountable for other cases. This type of emaciation is found especially in growing children.

Disease as a Cause. — Wasting diseases, such as tuberculosis and anemia, bring about a loss of weight, while in fevers in general and typhoid fever especially not only the febrile condition hastens the metabolic processes but also the activities of the bacteria act together and break down the tissues of the body, causing a falling off from the normal body weight. Loss of sleep, unhygienic or unsanitary surroundings, and capricious appetites probably cause some of the cases of excessive thinness.

Thinness in Children. — Parents are to blame for much of the thinness seen in children, especially the nervous high-strung children whose energies outweigh their desire for food or, as is more often the case, their willingness to eat the proper foods. It is a mistaken kindness to cater to the whims and fancies of a child's appetite, and much harm is wrought by allowing the "trash" to overbalance the necessary building or repair food in the dietary. Not that sugar is not necessary, for it is particularly so at the age when the metabolic processes are faster than later in life, but it must be remembered that the body is being built up both in height and breadth.

The Need for Building Foods. — The skeleton and the muscular tissues cannot be constructed from sugar, hence the diet which consists chiefly of this food constituent is unbalanced and will sooner or later bring about disturbances which are very apt to result in emaciation. **The causes of emaciation may be** summarized as follows:

(1) Those cases which are due to pathological conditions such as tuberculosis, anemia, typhoid fever, etc.;

(2) Those induced by errors in diet and bad habits such as

insufficient or improper food, loss of sleep, over-exercise, lack of ventilation in the sleeping apartment, which destroys the appetite;

(3) Malformation or deformities of mouth, throat, or stomach which make it impossible for the individual to partake of sufficient food to cover the needs of the body;

(4) Heredity ("constitutional thinness").

Regulating the Diet. — As has been stated in a former chapter, any persistent loss of weight or failure to gain on the part of an infant whose chief business in life should be to grow, should be given immediate and careful attention. As a rule the diet is to blame; it is either improperly balanced, insufficient in amount, or poorly prepared, any of which might readily cause a disturbance to the delicate apparatus of the child.

Diet and Habits. — In adults, the diet and habits of life are in many cases to blame for the excessive thinness seen in many individuals. If the trouble can be traced to some abnormal condition, it can only be removed by relieving or checking the disease which induced it. The older methods of treating typhoid fever, for example, did nothing to prevent the progressive emaciation which was the result not only of the accelerated metabolism from the fever but also from the invasion of the intestinal tract by the specific bacteria which brought about a like result. In tuberculosis a similar breaking down of the tissues occurs, as is likewise the case in anemia and other diseases in which the functions of the blood-making organs are interfered with. Any of the above diseases may cause emaciation, and the treatment in most of the cases resolves itself in removing the cause as far as possible and in adjusting the diet.

Selection of Food. — The dietetic treatment for emaciation is practically the only one which will materially change the weight of the individual, since by food alone is the body built. Certain foods are more capable of being readily converted into adipose tissue than others, and these must have a prominent place in the dietary.

Rules and Regulations. — In obesity it was found that it was necessary to curtail the sleep and rest, increase the amount of exercise and decrease the amount of food. In emaciation practi-

cally an opposite régime is adopted. The patient is urged to eat plenteously, drink copiously of water and nutrient beverages, soup, etc., avoid worry and excitement, over-exertion and indigestion, to take one or two naps every day, to retire early, to avoid hot baths and take a warm cleansing bath followed by a cold shower or sponge bath. Exercise must be of a mild character; the patient must be warned against becoming exhausted, since this condition precludes a gain in weight.

Dietetic Treatment. — The meals must be carefully selected, well prepared and daintily served, that all of the psychical benefits from such efforts may be attained. A nutrient beverage such as cream, egg, and vichy, reënforced fruit beverages, malted milk, with egg and chocolate, cereal and milk gruels, etc., may be given between breakfast and lunch, lunch and dinner and before retiring. The meals must consist of the simplest foods that the digestional apparatus may not be overtaxed by the added quantity ingested.

Allowable Foods. — The following foods may be used in the treatment of emaciation: All dairy products, milk, cream, butter and cheese, eggs cooked in various ways, soups of all kinds, meats in moderation, vegetables, especially potatoes, olive oil, and the various salad oils, cereals, tapioca, macaroni, spaghetti, noodles, rice, bread of every description, fruit including bananas, grapes, dates, raisins, prunes, etc., ice creams, farinaceous puddings, sauces, except those containing vinegar, grape juice and other fruit juices sweetened with sugar, cocoa and chocolate, malted milk and proprietary infant foods, honey, molasses and sirups, cakes, cookies and pastry in moderation. It is advisable to make milk the chief fluid food; to this is added cream, malted milk, lactose, eggs and other reënforcing agents.

Milk Cure. — Certain physicians advise milk alone, giving from one to two gallons a day for three weeks or longer. Many individuals complain that "milk makes them bilious" but as a rule this is because the amount taken is small and the solids insufficient to lend the necessary bulk to the feces, consequently the peristaltic action becomes sluggish and the passage of the food mass delayed in the intestinal tract, furnishing a medium for bacterial growth and

activity. When larger quantities are ingested such is not the case and the fluid so high in nutrient qualities is utilized by the body for the building up of the depleted tissues. When the emaciation is the result of disease the diet is necessarily adjusted to meet the condition. At times it is most difficult to overcome the anemia and accompanying emaciation on account of the disease precluding the giving of the foods especially designed by nature to produce flesh. This is especially the case in the progressive emaciation in diabetes. However, in this case the Allen starvation treatment, with the reëducation of the organs to a toleration for carbohydrates, has gone far toward overcoming this distressing condition.

Readjusting the Habits. — When the loss of weight is found to be the result of close application to work, lack of fresh air and sleep, or from errors in diet, a change of climate and occupation should be made, together with a readjustment of the daily habits, such as substituting a cool bath for the regular hot one, and sleeping out of doors or on a sleeping porch instead of in a poorly ventilated bedroom.

The patient must be urged to eat, regardless of appetite, for in this way only can the body weight be increased. The dietary must be made up largely of the fat-forming foods, but not to such an extent as to upset the nitrogen equilibrium.

The following diet sheet is given to be used as a guide in the treatment of emaciation. Other foods of a similar composition and fuel value may be substituted for those given here, to vary the diet.

EMACIATION DIET SHEET

Approximately 5106 calories

Material	*Amount*	*Protein Gm.*	*Carbohydrate Gm.*	*Fat Gm.*	*Total Calories*
Breakfast:					
Stewed prunes	6 prunes	1.02	35.26		145.
Sugar	1 tbs.		14.7		56.6
Oatmeal	1 tbs. (dry)				
with cream and sugar	2 tbs. cream 1 tbs. sugar	3.2	25.0	6.6	172.2

EMACIATION DIET SHEET — *Continued*

Material	*Amount*	*Protein Gm.*	*Carbohydrate Gm.*	*Fat Gm.*	*Total Calories*
Poached egg	1 egg	5.35		4.16	58.8
Toast	3 slices	7.9	44.7	13.0	328.
Butter	1 tbs.				
Coffee	1 cup				
with cream and	1 tbs. cream	.40	.40	2.8	53.9
sugar	2 tsp.		9.45		
Milk and cream	⅔ cup milk ⅓ cup cream				389.
11 A.M.:					
Cereal milk gruel	8 oz. (1 cup)				248.
with cream	1 ounce				
Lunch, 1 P.M.:					
Cream of pea soup	8 oz. (1 cup)	6.	17.65	7.66	185.9
Potato salad	3.5 oz. (1 serving)	1.75	15.5	15.33	210.
Bread	3 slices	7.8	44.7	1.04	328.
Butter	1 tbs.	.8	1.4	5.6	
Cocoa made with milk	1 cup				
Sugar	2 tsp.	27.	27.6	41.4	661.
Milk	⅔ cup				
Cream	⅓ cup				329.
3:30 P.M.:					
Cream, egg, vichy	8 oz.	4.9	12.4	36.	393.
Dinner:					
Tomato bouillon	1 cup				38.
with whipped cream	1 tbs.	.30	.42	5.67	53.9
Beefsteak	1 serving (3 oz.)	18.6		17.34	230.5
Mashed potatoes	½ cup	1.16	7.5	3.5	66.5
Cauliflower	1 serving	1.53	2.99	.42	21.8
Asparagus salad with	6 stalks	2.00	3.72	.24	111.8
mayonnaise	2 tsp.	.01	1.45	9.00	
Bread	2 slices	5.2	29.8	.68	419.
Butter	2 tbs.	.28		24.09	
Charlotte russe	1 serving	2.3	11.1	22.6	257.
Milk and cream	⅔ cup ⅓ cup				389.
Black coffee if desired	½ cup				
At bed time:					
Malted milk made with milk and reënforced with lactose	1 cup 1 ounce	8.4	41.	10.2	288.5

Methods of Increasing the Diet. — The above diet furnishes three times as much food as is needed to maintain the body living a sedentary life, or about as much as would be needed to maintain a lumberman at hard outdoor labor in the Maine woods. It would be impossible for an ordinary individual to handle such an abundant diet without making the increase in the diet gradually. This is best done by adding the milk and cream at the end of each meal and a glass of milk between meals and at bedtime, then gradually adding the fattening foods already mentioned until the diet approximates the diet sheet here computed.

SUMMARY

GOUT

Gout is a constitutional disease characterized by an inflammatory condition of the joints.

The Joints are the seat of chalky deposits of uric acid or sodium salts.

Metabolism in gout is disturbed, with a consequent retention instead of elimination of uric acid by the body.

The Blood contains an excess of uric acid which increases greatly during an acute attack.

The Urine in true gout does not contain an excess of uric acid except during an acute attack, whereas in the so-called gouti-ness there is a constant excess of this acid.

Uric Acid is produced as the result of the metabolism in the human body of the nucleoproteins and in food of the purin bodies.

Alcohol undoubtedly assists in the retention and increases the difficulty of uric acid elimination by the body.

Chief Causes of Gout. — Overeating, excessive alcoholism, and too little exercise, especially in the open air.

Treatment consists in regulating the diet both as to the quantity and type of food eaten; reducing or eliminating the alcohol in the dietary, and increasing the amount of outdoor exercise.

Dietetic Treatment. — The best results are obtained by reducing the size of the meals and avoiding the purin-bearing foods as far as possible. Eggs are purin-free and may be substituted for much of the meat in the diet. In chronic gout it is impossible to eliminate meat entirely from the diet, but the quantity can be materially reduced and that which is eaten may be rendered less harmful if it is boiled instead of roasted or broiled, as in this way much of the purins is dissolved out. Highly spiced and seasoned foods, rich gravies, etc., are apt to cause an acute attack and should be omitted. Excesses of all kinds must be avoided to enable the patient to live a fairly comfortable life, free from frequent painful attacks of gout.

OBESITY

Causes. — Heredity, overeating, unbalanced diet, chronic alcoholism, and disturbed metabolism, as manifested in gout and other pathological conditions.

Cures are more or less of a risk, except when undertaken upon the advice and under the care of a competent physician. As a rule they are too strenuous to be carried out alone and are of no good unless persisted in. Among the best known obesity cures may be mentioned those formulated by Banting, Oertel and Ebstein.

Most physicians have their own methods of treating obesity, but all are based primarily on diet and exercise.

Food is the chief cause of obesity and since some foods are more readily converted into adipose tissue than others, it is necessary to understand the behavior and functions of the various food combinations in the body before it is possible to say which are the offending articles of diet.

Water has no fattening properties of its own. This is proved by a glance at its chemical composition, but as it acts as a distributer and carrier of food to the various parts of the body and since the bulk of all the secretions is composed of water and every tissue in the body stores this fluid, thus adding to the weight, a

consideration of the intake of water for obesity patients is most essential.

Appetite requires attention. The majority of obese patients eat more than their energy output calls for, consequently it is necessary to curb the appetite and increase the energy output in order to utilize the material on hand in the form of adipose tissue.

Exercise is absolutely essential in order to force the body to burn up its surplus fat as fuel. The best form of exercise is that which is taken out of doors. The well-worked muscle is heavier than one which is unaccustomed to exercise. The latter is infiltrated with fat and weighs less than muscular tissue, but a muscular body can endure more than one which is covered with adipose tissue.

The Heart of obese patients becomes more or less affected as obesity advances and it becomes absolutely necessary in many cases to get rid of some of the surplus fat in order that the patient may live. This is best accomplished by dietetic treatment.

Circulatory Changes likewise occur as the heart becomes affected, making it necessary to institute some dietary measures at once.

Glycosuria in obese patients suffering from gout is not at all unusual and to relieve this condition the carbohydrates in the diet must be at once reduced.

Dietetic Treatment is most important. It constitutes the only rational method of ridding the body of its surplus fat. To do this it is necessary to regulate the diet both as to quantity and type. Fat-forming foods are those which the body utilizes most easily for the production and storage of fat. Any food, no matter whether it is fat-forming or not, if taken greatly in excess of the needs of the body, will be stored as adipose tissue.

Chief Points to be remembered in formulating a diet and instituting an obesity treatment are the necessity for *small meals* and *dry meals*, no fluid given at all during the meal except perhaps one or two small cups of coffee per day, without sugar or cream, the avoidance of fat-forming foods, sugars and starches in all forms, milk, cream, butter and oil, potatoes, bananas, fat meats

of all descriptions, especially pork, soups of every description and alcoholic or malted beverages. It is necessary to limit the amount of sleep, prohibiting naps during the day, and to increase the amount of outdoor exercise.

Massage is advisable, especially in those patients who are unable, on account of their excessive weight or heart symptoms, to take the requisite amount of exercise necessary for their future welfare. Massage likewise makes the muscles firmer, often preventing the disfiguring sagging of the skin caused by depriving it of its padding of fat.

EMACIATION

Causes. — Errors in diet, overwork, over-exercise, heredity, nervousness, worry, malformation of the mouth, throat, or stomach, heredity and certain pathological conditions, such as typhoid fever, tuberculosis, anemia, dysentery, etc., in which the breaking down of the tissues occurs more rapidly than they can be rebuilt.

Children are often emaciated on account of their unbalanced diet. They receive an insufficient amount of building food to cover their growth and development requirements. Parents are often to blame for allowing the child to overeat of some of the food constituents at the expense of others. Sugar, for example, is very necessary in the diet of a growing active child, but all sugar and very little milk and eggs will lead to an unbalanced diet which may bring about a condition of extreme thinness later on.

In Adults the constant eating of the wrong foods, overworking and persistent worrying, all contribute to the breaking down of the tissues which ends in emaciation.

Weight is an index to health. Any persistent loss of weight on the part of an adult or loss or even failure to gain in a growing child, are indications that all is not right and immediate measures must be taken to locate and relieve the trouble.

Loss of Weight due to pathological conditions can only be relieved by removing the cause, after which the diet may be adjusted to suit the condition.

Dietetic Treatment is practically the only means of combating and overcoming emaciation, since it is by food alone that the body is built.

Fat-forming foods, which in obesity were prohibited, have a prominent place in the diet for emaciation. Padding the nerves and organs with a layer or covering of fat protects them from the jars and shocks incidental to daily life, besides lending grace and contour to the body.

Foods Which Produce Fat are nutrient beverages of all sorts; milk, malted milk and cream are especially valuable; water, because of its particular properties and functions in the body; and fruit beverages, which are made chiefly of water and sugar, are always included in the dietary. Milk and cream, soups and milk gruels, as well as all dishes made with milk or cream, add materially to the fat-forming quality of the diet. Butter, olive and other salad oils, as well as cereals, potatoes, bread and simple desserts, are advised. The diet must be bountiful, the meals frequent, and lunches consisting of milk or cream with crackers will hasten the gain in weight.

Rest, preferably lying down, is absolutely essential. A period of relaxation covering from fifteen to thirty minutes should be taken before or after each meal. The body derives the use of the food for the storage of fat which would otherwise be required to cover its energy expenditures.

Sleep is essential to gain, consequently the patient should retire early and take one or two naps during the day.

Baths should be warm, not hot, followed by a cold shower or sponge.

Exercise must be mild in character; over-exertion precludes a gain in weight and exhaustion undermines the forces which make it possible for the body to store fat as adipose tissue.

Nervous Excitement and Worry must be avoided.

Gastro-intestinal Disturbances should be guarded against, since all the pounds gained through months of treatment may be quickly lost during one acute attack of diarrhea or auto-intoxication.

Massage is advised. The kneading and gentle manipulation of the muscles stimulates them to utilize more food material, besides enabling the patient to eat more by reason of an increased appetite.

The Milk Cure has been used extensively in overcoming extreme emaciation. It consists in the taking of large quantities, ranging from one to two gallons per day. It is given every hour or oftener for a period of one month to six weeks.

Reënforcing the Diet with eggs and lactose is often found of great value in increasing the weight quickly, as is the giving of one-third of a glass of cream and two-thirds of a glass of milk after each meal and at bedtime. The whole scheme of putting on pounds resolves itself into the giving of proper food in larger quantities than are ordinarily given, but dividing it up into frequent meals in order not to upset the digestion and do away with the good already accomplished.

CHAPTER XXV

OTHER CONDITIONS MORE OR LESS AFFECTED BY DIET

PTOMAINE POISONING, ACIDOSIS AND PELLAGRA

PTOMAINE POISONING

THE poisoning due to ptomaine is very similar to that brought about by overeating and other dietetic errors. However, it is not so easy to avoid being poisoned by ptomaines as it is to observe moderation in the quantity of food eaten.

Origin. — These substances are believed to be of an infective bacterial origin and may be present in foods which are otherwise seemingly fresh and good. The fact that they cannot be detected in food without an analysis makes them more of a menace than they would otherwise be, for any substance which is not discernible to our senses, the taste, sight, or smell, and which exerts a baleful influence, such as ptomaine, cannot be anything but a menace to humanity.

Infected Food Materials. — We may congratulate ourselves in the knowledge that these substances are not present in many foods, and if we avoid eating nitrogenous materials, which may have become polluted, either through imperfect canning or by standing in unclean vessels, we may avoid much of the poisoning which may otherwise be due to the action of ptomaines.

Chicken Salad and Ice Cream Poisoning. — Certain violent attacks of so-called ptomaine poisoning may be traced to chicken salad which has been allowed to stand overnight in tin receptacles or to ice cream which has melted and been re-frozen. In any case the treatment remains the same.

Treatment. — The patient is put to bed and the intestinal tract cleansed by means of enemas and in many cases purgatives (salts, castor oil, etc.) as directed by physician.

The symptoms usually present in those suffering from ptomaine poisoning are nausea, vomiting, dizziness, pain more or less violent in character, and prostration which is at times alarming.

Dietetic Treatment. — The treatment instituted under the circumstances is very much the same as that used in other forms of acute poisoning. All food is withheld for a period; the duration of this starvation must necessarily depend upon the condition of the patient, the violence of the poison and the extent of the prostration.

Rectal Feeding. — When the prostration is great, it is sometimes necessary to give saline enemas and even rectal alimentation to prevent collapse.

Fluid Diet. — After the violent attack subsides, the patient is placed upon a fluid diet similar to that used in auto-intoxication and practically the same as the diet for acute infectious diseases. The diet must be gradually increased until it becomes normal and the nurse must remember that the patient is in a condition to suffer a relapse with the least indiscretion. It is advisable to have a thorough investigation made to ascertain the source of the original attack, that the patient may be able to avoid future trouble from partaking of the same food.

Personal Idiosyncrasies. — It may be that there is a personal idiosyncrasy against one particular food, and in this case it becomes more or less of a simple matter to prevent future attacks. Certain individuals are, for example, invariably poisoned by eating shellfish, others manifest a similar idiosyncrasy against strawberries. Thus is the old proverb demonstrated: "What is one man's meat is another man's poison." And he who wantonly flies in the face of the danger signals Nature provides for his guidance must necessarily suffer the consequences of his folly.

It has been proved with certain individuals that the foods that at one time cause an attack of poison at another time may be eaten with impunity. Thus it would seem to remain a question not so much of the type of poison, ptomaines, etc., as the amount of resistance manifested at the time by the individual partaking of the infected food.

ACIDOSIS

Metabolism of Fats. — Acidosis is a condition believed to be due primarily to some impairment in the metabolism of fat in the body, in consequence of which there is an accumulation of substances more or less irritating and at times toxic in character in the blood. These substances, known as acetone bodies, are especially apt to appear in the urine of individuals suffering from diabetes, likewise in those undergoing starvation, whether as a result of treatment to overcome a definite pathological condition, as in diabetes, or as the result of disease itself.

Malnutrition as a Source. — Certain individuals, children especially, develop symptoms of acidosis under many different circumstances; for example, in many cases of malnutrition the evidences of acidosis are almost invariable. The treatment in these cases must be, of course, prompt in order that the condition may not assume a serious aspect.

Dietetic Treatment. — The diet is adjusted in order to neutralize the effect of the acid in the blood. This is done in two ways: first, by reducing the fat, and second, by increasing the amount of base-forming foods in the diet.

The following table[1] illustrates the foods in which the acid-forming elements and base-forming elements predominate:

FOODS IN WHICH ACID-FORMING ELEMENTS PREDOMINATE

Estimated Excess Acid-forming Elements Equivalent to C.C. Normal Acid per 100 Calories

Beef, free from visible fat	10
Eggs	.9
Round steak	6.7
Oatmeal	3.2
Wheat flour	2.7
Wheat, entire grain	2.6
Rice	2.4
Bacon	1
Corn, entire grain (high protein)	.1

[1] "Chemistry of Food and Nutrition," by Henry Sherman.

FOODS IN WHICH BASE-FORMING ELEMENTS PREDOMINATE

Estimated Excess Base-forming Elements Equivalent to C.C. Normal Alkali per 100 Calories

Celery	40
Cabbage	10–13.6
Potatoes	9–12
Prunes	7.9
Turnips	6.6–12.5
Apples	5
Milk	3.3
Beans	2.9–6.8
Peas	1.9
Corn, entire grain (low protein)	.8

The fruits likewise show a predominance of base-forming elements over acid-forming elements and for this reason may be used to balance the diet.

Diabetic Acidosis. — The acidosis during diabetes has been already discussed in the chapter devoted to that disease.

It has been found advisable in the majority of cases of acidosis to restrict the fat in the diet of all patients who, during the course of a disease, have given evidence of this condition; at the same time it is well to remember that fat is one of the essential food constituents and absolutely necessary to the welfare of the individual, consequently it is impossible to eliminate it from the diet entirely. The only feasible method, then, to pursue under the circumstances is to restrict the fats in the diet so long as there are symptoms of acidosis and to add them gradually and in very small amounts until the individual's tolerance for fats is determined.

Balancing the Diet. — In many cases of acidosis due to starvation, no matter what the cause, the diet must be necessarily regulated and properly balanced. It would be decidedly unwise to attempt to build up the body by giving building foods alone, without due consideration to the foods containing the agents provided by Nature to neutralize the acid formed during the process of their metabolism. It is readily seen in the table just given that meat and eggs show a marked excess of acid-forming

elements, whereas vegetables and fruits yield an excess of base-forming elements. With this data, it becomes more simple to balance the diet and to avoid the acidosis which may arise from impairment of the fat metabolism of the body.

PELLAGRA

The enormous increase in the number of cases of pellagra in America during the last twenty years makes it necessary for something to be done to arrest its progress. The cause of this disease is still under discussion, but much has been done to find out definitely the reason for the tremendous increase in the number of cases, especially in the Southern States, where the increase has been most noticeable.

Infectious Bacteria, Silicon, and Lack of Vitamines. — Many investigators believe the disease to be caused by the ingestion of certain foods infected by the action of a definite type of bacteria, while others believe it to be induced by the drinking of water impregnated by colloidal silicon. Still other scientists claim that pellagra is the direct result of an unbalanced diet, especially one in which the vitamines are noticeably lacking.

Nutrition in Pellagra. — At present we cannot say positively that pellagra is a nutritional disease any more than we can say that tuberculosis is a nutritional disease. We only know that diet undoubtedly plays an important part in the relief of each of these conditions, and to this end we must direct our efforts.

Dietetic Treatment. — The diet for pellagra must necessarily be such as to overcome as far as possible the progressive emaciation which is an important symptom in the disease. However, it must be kept in mind that gastro-intestinal disturbances are likewise prominent and that diarrhea is often most difficult to overcome. For these reasons it is essential to formulate a diet which will not interfere with the treatment for the disease, and which will be at the same time one in which the patient can gradually be built up, and in this way benefit, as far as possible, under the circumstances. The diet used in the treatment of anemia seems to be the one best suited to meet the requirements of the patient

suffering with pellagra; changes may be made in this diet, however, by the physician, who will be able to judge the need of the individual under his care. Whether pellagra can be cured by dietetic treatment is very uncertain, but the condition of the patient can undoubtedly be materially improved, provided the treatment is begun sufficiently early; that is, before the disease has progressed to such an extent that neither diet nor anything else can bring about a cure.

The above dietetic treatment is not claimed to be infallible. It is merely given as a suggestion to be used at the discretion of the physician.

In all probability the treatment of pellagra will undergo a definite change in the near future, but at present our best results accrue from the giving of an adequate, well-balanced diet. The extent of the relief of such dietetic measures depends, as has already been stated, upon taking the disease in its early stage.

SUMMARY

Food Poisoning is more or less common, being induced by polluted water, milk, or other foods, bad sanitation, and imperfect canning, as well as to certain obscure substances known as ptomaines.

Shellfish have often been found to cause poisoning in certain individuals. Stale fish is apt to cause the most violent type of poisoning in any individual.

Chicken Salad which has been kept overnight in tin receptacles has been known to cause violent attacks of poisoning.

Ice Cream which is melted and re-frozen is likewise a source of a number of the cases reported.

Symptoms. — Very like those of auto-intoxication, and violent intestinal disturbances are manifested.

Prostration is apt to be great, according to the violence and duration of the attack.

Anemia follows many cases of poisoning as a result not only of the impairment and lack of nutrition of the blood-making

organs, but also on account of the other symptoms, especially diarrhea occurring in the disease.

Dietetic Treatment like that used in acute gastro-intestinal disturbances begins with a starvation period and is followed by a simple fluid diet until violent symptoms subside. Examination of the stools and the material vomited will, at times, furnish an insight as to the source of the poison.

Convalescent Diet is begun after the violent symptoms have subsided, but care must be taken not to increase the diet too rapidly, owing to the danger from relapse.

Method of Administering Diet. — First: a period of total abstinence from food.

Second: fluid diet consisting of broth, buttermilk, or some of the predigested liquid beef preparations which furnish both food and stimulation necessary in such cases.

Rectal Feeding may be found necessary when the prostration is great.

Personal Idiosyncrasies should be taken into account and effort made to find whether or not the attack is caused by any one food material or to bad sanitation or unclean food. The patient should be warned against the danger of taking a food which has caused a previous attack of poisoning, especially in cases where a personal idiosyncrasy against a food has been manifested.

Resistance of Poison in food seems to be the chief thing. The strength and vigor of a body lends resistance and assists materially in combating bacterial activities. Thus if ptomaines are of bacterial origin, as many investigators believe them to be, the safest plan is to keep the physical condition good and in this way prevent their getting a hold on the body.

Other Precautions against ptomaine and other food poisoning. Patients are recommended to eat no food which has been carelessly handled, kept in unclean receptacles, improperly canned, or allowed to stand in tin for any length of time.

ACIDOSIS

This condition is more or less common, especially in the disturbances manifested by children.

Cause of acidosis is believed to be an impairment of metabolism, especially in regard to the fats.

Starvation or Malnutrition is believed to produce many cases of acidosis in childhood and adults suffering from diseases in which certain foods have been limited.

Diabetes in which there is an impairment in the metabolism of carbohydrates, resulting in the unavailableness of these foods as neutralizing agents of the acids formed in the body, is one of the chief diseases in which acidosis develops and in which the results are so apt to be fatal.

Dietetic Treatment consists chiefly in limiting the fats in the diet and increasing the amount of neutralizing agents in the food.

Alkalies are at times given when acidosis is prominent, but these substances, other than those occurring in foods, must be given only upon the advice of a physician.

Conclusion. — As to the relief of acidosis, everything points to the advisability of balancing the diet both as a means of preventing and overcoming the condition. Even when acidosis is a symptom of starvation it is not wise to increase the building foods materially without allowing a certain amount of base-forming or neutralizing material to offset the increased production of acid in the body.

PELLAGRA

The cause and cure for this disease are still a matter of discussion. Whether it is the result of a definite bacterial infection or whether it is due to the presence or absence of certain substances in the food materials, is as yet to be determined.

Diet in Pellagra is most important. It is impossible to say that pellagra is a nutritional disease, but it is certain that in balancing the diet much has been done toward relieving the condition.

The Diet is directed toward overcoming the progressive emaciation which is a prominent feature in the disease in its advanced stages, and toward preventing gastro-intestinal disturbances.

Diarrhea is one of the chief symptoms of the disease and great care is needed in formulating the dietary in order not to increase this condition.

Conclusion. — The diet is thus shown to be directed toward overcoming the emaciation and anemia and relieving or preventing the gastro-intestinal disturbances which are so apt to occur. It must be remembered that even a well-balanced diet will not materially relieve the condition unless it is instituted sufficiently early.

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By DIANA C. KIMBER

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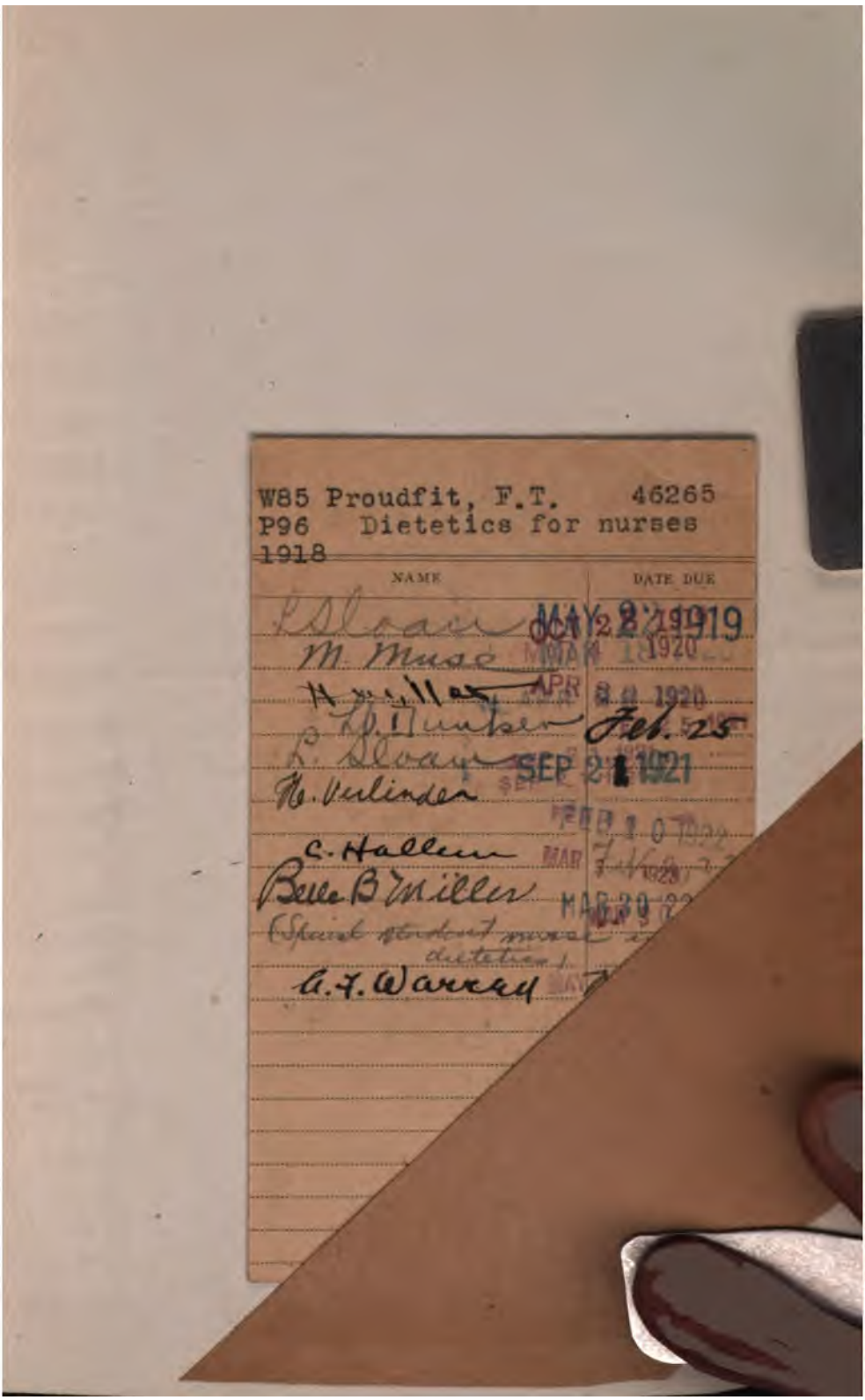
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